Can the child witness provide accurate testimony?

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Abstract

It is important to identify ways in which the interview process can be manipulated to ensure that children's potential to be accurate eyewitnesses is fulfilled. There is current debate about the effectiveness of using drawing as a recall aid with children in interviews. Experiments 1 and 2 investigate whether the facilitative effect on memory of drawing during the interview remains when children are asked irrelevant as well as relevant questions concerning an event. The results of these experiments suggest that drawing can increase children's recall without an associated reduction in accuracy. Methodological issues are discussed, and the findings are related to possible recommendations to the process of interviewing children

To fully understand the capabilities of the child witness it is important to know what children are likely not to recall. In three experiments (3,4 and 5) children were less likely to recall a target scene from an event when it was omitted and covered up during a postevent information review of the remaining scenes. Comparisons were made to a control group who did not benefit from a review of any information, but who were more accurate in recalling the target scene. Memory for the target scene was rendered inaccessible, but it was not forgotten, children recalled the target scene when relatively simple retrieval cues were introduced during the interview. In experiments 3 and 4 the original event was interactive and the findings applicable to many eyewitness situations.

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I dedicate this thesis to my family.

DECLARATION

I declare that the work in this dissertation was carried out in accordance with the Regulations of the University of Bristol.

The work is original except where indicated by special reference in the text and no part of the dissertation has been submitted for any other degree.

Any views expressed in the dissertation are those of the author and in no way represent those of the University of Bristol.

The dissertation has not been presented to any other University for examination either in the United Kingdom or overseas.

SIGNED: .....

DATE: .....

"Children's apparent lack of credibility may have as much

to do with the competence of adults to communicate with children as it does with

children's abilities to remember and relate their experiences accurately".

Saywitz (1995, pp. 115)

Chapter 1

Introduction

Overview

It is important to distinguish between objectives and aims when reviewing the literature and designing experiments to investigate the abilities of the child witness. The main objective of investigating the abilities of the child witness is instigated by the increasing number of children that are required to testify in courts. In a general sense the objective is: to improve the methods used to interview the child witness and ensure that children's potential to give accurate and detailed testimony is maximised. To illustrate this objective, the first section of this introduction concentrates on the legal aspects of children's testimony and shows by example the urgent need for research into the abilities of the child witness. The scope of the experimental work in this thesis is necessarily too narrow to address this broad aim, but the specific steps within the work make an important contribution to the body of work that is concerned with this objective.

The main aim of this thesis is to address two research questions. The first research question is concerned with the effects of drawing during an interview on children's recall. This was originally expected to provide the most interesting and strongest results, but has in fact become a secondary focus mainly due to the null results it produced and also due to the dominance of the strong results

from the second research question. The aim of investigating drawing as an aid to children's recall derives from the overall general objective; to identify the methods and conditions that should be employed to ensure that children reach their potential to provide accurate and admissible testimony. The main body of the introduction presents the existing literature and arguments on these topics and progressively exposes the gaps in the literature that the experimental work in this thesis is concerned with. The second research question which became the most dominant one concerned with investigating the possibility of making memories less accessible. In other words can manipulations be made to induce memories not to be reported and if this is the case what are the implications on the accuracy of testimony and recall? This is an area that until now has not been investigated. The strong results that are reported in this thesis are not just a new finding; they have enormous theoretical importance and applicable relevance for interviewing children. Theoretically it may contribute to the ongoing investigation into how children's memories work and how memory systems and processes develop. In terms of application it may allow adaptation of the interview process that children are subjected to, to ensure that every effort is made to allow the recall of memories that may be vulnerable to being inaccessible.

The final section of this introduction provides a brief overview of some of the other research concerning the child witness that has been carried out recently. These issues are not directly linked to the

research questions that I have identified, but they are important considerations in the design of eyewitness experiments. Eyewitness experiments are usually designed to simulate an interview situation. The potential for confounding variables increases at the design stage of any eyewitness experiment as consideration must be given to the type of event used, the cognitive abilities of children and the interview situation (context, questioning etc), among others. With the effective design of experiments in mind, this section is included. Finally a summary of the contents of the experimental work and of the remaining chapters is included.

Section 1: The main objective

1.1 Legal Background on the Child Witness

Twenty years ago the view of the child witness was one of incompetence and inaccuracy (Heydon, 1984, in Bull & Davies, 1996). A child's observational and memory capabilities were thought to be less reliable than an adult's. Children were deemed egocentric and suggestible, having difficulty distinguishing reality from fantasy. The strict interpretation of the competency requirement made it impossible to hear the testimony of children under six years old, and when children were permitted to testify they did so on adult terms (Naylor, 1989).

When direct comparisons have been made between adults and children's performance as eyewitnesses, some researchers concluded that children are more suggestible and more inaccurate

than adults are (Ackil & Zaragoza,1998; Coxon & Valentine, 1997). However these experiments did not account for the general age differences in cognitive development and led to the criticism that the differences may be more to do with a general developmental change in ability rather than a specific difference in the capabilities of eyewitness performance per se. Indeed research into the capabilities of the child witness has repeatedly contradicted this initial belief in a specific childhood inaccuracy, and shown that, under certain circumstances, child witnesses can provide accurate and admissible testimony (Goodman & Bottoms, 1993). In 1988 the corroboration rule was banned, and with it the requirement to warn the jury of the dangers of accepting a child's testimony. The 1993 Criminal Justice and Public order act emphasised that "a child's evidence shall be received unless it appears that the child is incapable of giving intelligible testimony" (Bull & Davies, 1996, p. 99).

Although the admittance of a child's testimony is now a more common occurrence in courts of law, and is being taken more seriously, there are still some major misconceptions about children's capabilities and some problems with the process that a child witness is subjected to. One of the main problems is that adults' interpretations of children's testimony can often be wrong. Sutherland, Gross, and Hayne (1996) provided a group of adults with interview transcripts from a previous study, half of the participants were informed about the event relating to the transcripts, and half were naive. The results indicated that even

when the child's testimony was completely accurate, adults had difficulty in interpreting their transcripts correctly. Informed adults made more errors, maybe due to overconfidence from the prior information. Naive adults were more cautious, but provided a less detailed and coherent account of the event; they also tended to fill in the gaps in their knowledge with erroneous statements. This evidence has extensive legal implications, as the procedure used in this study bears strong resemblance to that used in a courtroom.

Optimistically, it appears that the feud between lawyers and psychologists may be subsiding and research is beginning to influence some of the recent changes in the process of interviewing children. For example Flin, Kearney, and Murray (1996) conducted a survey of child witnesses that revealed that children fear the prospect of attending court and providing evidence primarily because they do not understand what will be required of them. Preparing children to give evidence by giving them information about the processes that they will go through can increase the likelihood of them presenting accurate and admissible testimony (Saywitz & Snyder, 1993; Saywitz, 1995). Other changes to the court process resulting from research have been recommended including the removal of wigs and robes, clearing the court and testifying by closed circuit television (cctv). Language that is used in the courtroom is often not understood by children. The grammatical construction of sentences and use of the double negative is beyond the comprehension of young children (see Saywitz, 1995 for

a review). The rules of conversation that children learn normally, are not followed in the courtroom. In 1988 the use of videotaped evidence during trials was proposed and this has been commonplace since 1992. Recently the government introduced even more changes to the guidelines for interviewing witnesses including allowing videotaped evidence to be used in cross-examinations (Wescott, 2001).

1.2 A Case Study

In parts of this thesis I will refer to a case study as an indication of the notable importance of studying the child witness. The Wee Care case took place in August, 1988; school teacher Kelley Michaels was accused and convicted of sexually abusing a number of children aged 3-6 years in her care. The case is largely judged as a starting point for the surge of interest in researching the capabilities of the child witness. The event triggering the allegations came when a child who was having his temperature taken rectally reported that this was what his teacher did sometimes. Six days after the first allegation Kelley Michaels was voluntarily interviewed for 9 hours, she took a lie detector test and passed. Two days later the case was closed. In the weeks following parents met with a sexual abuse consultant and a psychologist who were convinced that the abuse had taken place and who informed parents of the signs to look for in their children. During the following month children reported all kinds of bizarre physical and sexual abuse, there was, in my opinion no medical, physical, or forensic evidence to support

any of the allegations. Kelley Michaels was brought to trial and nineteen children testified. A guilty verdict ensued and Kelley was sentenced to 47 years in prison. The verdict has since been overturned and Kelley was released by the court of appeal after serving five years (See Rosenthal, 1995 for a detailed overview).

Section 2: Experimental Aims

2.1 Aim 1: Drawing During an Interview

Investigating the use of drawing during interviews with children was the first of my research aims. Many believe that the content of children's drawings can be interpreted to give indications about children's intellectual development and their emotional states. In interviews it is not the content of children's drawings primarily, but the production of a drawing as an aid to recall that is the main focus of the experimental work.

2.2 The Content of the Drawing

Children's drawings can be used to test the intellectual development of children. The Draw a Person test for example is designed to assess a child's stage of development from the inclusion of details on the person that they draw, and is included in some of the baseline assessments in the British educational system. Drawing has also been used in therapeutic contexts with children as young as four years despite the fact that there is little empirical evidence that supports its use (Burgess & Hartman, 1993). Although many of the results regarding drawing in these contexts seem positive, the

lack of solid scientific evidence to explain why or how this works is concerning. In cases of suspected abuse it is not uncommon for therapists to allow children to draw during interviews and to then base their assessments on the content of children's drawings. For example some believe that the over emphasis of genitalia in a child's drawing can be indicative of sexual abuse (Burgess, 1988). This is a strong assumption to make considering that young children are prone to draw from intellectual realism (what they know) rather than visual realism (what actually happened).

2.3 Drawing as a Memory Tool

Recent research with the child witness has focussed on the potential use of drawing during interviews. The first to look into the effects of drawing were Butler, Gross, and Hayne (1995). They believed that the problems children face are more to do with the retrieval of information rather than the encoding of information and that drawing may provide children with the means to increase their recall. In their study five to six year old children were taken on a day trip to a fire station; a series of staged events took place during their visit. Later children were questioned with or without the inclusion of drawing in the interview. The study was designed to be applicable as it involved a real event and strangers interviewed the children. The interviews were conducted with a free recall and a direct question stage in which children were asked up to four questions, and finally a stage involving photo recall. The results revealed that children who drew during the interview recalled more information

than those who verbally recalled only. Closer inspection revealed that the beneficial effects of drawing were mostly due to the direct questioning phase of the interview. In a further experiment following the same methodology, but testing younger children the facilitative effect of drawing was confirmed (particularly in the direct recall phase) with children aged five to six years, but there was little difference between the interview conditions with younger children aged three to four years. The beneficial effect of drawing was also constant over a longer delay between the event and the interview.

Butler, Gross, and Hayne (1995) noted that children who drew spent longer in the interview and that this alone may be the possible cause for the increase in recall when children drew during the interview. They also suggested that children stay on task for longer when they draw during the interview. Children who are interested in a task are often more willing to continue and remain focussed on the task for longer and therefore may produce more information than children who are engaged in a task that does not interest them. Further the authors suggested that drawing may serve to cue the child's own recall, reducing the child's reliance on external retrieval cues. In other words the child is directing the control of their own recall so that the story that they tell maintains a sequence that makes sense to the child. If an adult interrupts this self directed sequence by enforcing their own sequence upon the child in the form of questioning the child then some of the information that the child may otherwise have reported may remain unsaid.

However the authors eliminated the possibility that the beneficial effect of drawing originated from the social support that it offers to a child. Their reasoning for this was because experimenters had spent two mornings with the children in order to make them feel comfortable when they came to be interviewed. However the interview situation is a lot different to the classroom situation and two mornings spent in a classroom may not have been sufficient time to eliminate the social support explanation as a reason for the beneficial effect of drawing during an interview.

It has since been suggested that the coding used in the Butler, Gross, and Hayne (1995) study may be the reason for the positive results (Davison & Thomas, 2001). One memory point was awarded for each correct detail recalled. For example if a child answered the question 'How did you get there' verbally, they would say 'by bus' and be awarded one memory point. If children drew during the interview they would often provide more details such as the colour of the bus, the wheels etc and be given a correct memory point for each additional detail. Although Davison and Thomas (2001) strongly criticise this method of coding because both groups are correctly recalling the target answer, the extra detail elicited by the group that draw during the interview still has important benefits in the real world where information that may seem irrelevant can turn out to be the most important.

The study by Davison and Thomas (2001) was a more cognitively focussed study and investigated the effect of drawing

on children's item recall. In their study they showed children twenty-five items on a tray and had them study them. After four hours the five to six year olds were asked to recall as many of the items as possible. They did not find a beneficial effect of drawing. The authors accepted that the lack of result may be due to the increased cognitive effort that the children had to employ in order to make a drawing, verbally recall, and remember the items. In two further experiments they addressed this issue by including a condition where the children drew and then told (rather than drew and told at the same time). In these studies drawing during the interview reduced the amount of items recalled by five to six year olds compared to children who only verbalised their recall. In experiments designed specifically to simulate eyewitness situations the event to be remembered is usually more complex and has a running script. The present study did not have a linking theme to the objects shown and therefore the potential benefits of the children being cued to remember more by their own drawing would not be observed.

In real life situations the child witness is often interviewed and required to recall emotionally laden events. Gross and Hayne (1998) investigated the effect that drawing during the interview can have on the recall of events of this nature. They asked children to draw and verbalise or to verbalise only, a time when they felt happy, sad, and scared. Children who drew during the interview provided almost twice as much information about all of the emotional

experiences than children who verbalised only. In a further experiment the accuracy of recall was investigated when parents confirmed whether the experiences that children recalled had really occurred. Again children who drew during the interview provided almost twice as much information as the verbalise only group, and parents confirmed that the recall of events was highly accurate.

Gross and Hayne (1998) proposed three possible explanations for their results. Firstly the possibility that drawing may have reduced the need for external retrieval cues, and the children's own drawing provided them with a more accurate self-generated retrieval cue than an adult's external retrieval cue. Secondly drawing may help to organise children's narratives and allow them to tell a better story. A developmental shift occurs at around five years old and children become able to talk about the past. Drawing may facilitate this relatively new skill allowing the child to recall more information. Lastly as mentioned previously the facilitative effect of drawing may simply be due to the fact that children who draw spend longer in the interview.

More recently Wesson and Salmon (2001) compared the recall of emotional events from five and eight year old children. The authors had a group of children draw and verbalise recall, a group of children who re-enacted and verbalised recall, and a group of children who only verbalised their recall. Their results indicated that children who drew and re-enacted recall reported twice as much

information than those who only verbalised recall. However there were little differences between the recall of children who drew and those who re-enacted during the interview. The authors also noted that nature of the extra recall elicited by children who drew and those who re-enacted was more descriptive and concerned with emotions and actions than the recall of those children who only verbalised their recall.

Wesson and Salmon (2001) concurred with the explanations that Gross and Hayne (1998) proposed as to why drawing and re-enactment may increase children's recall. The explanations included the possibility of children feeling more in control of the interview process and of the speed of their own recall and being able therefore to recall more information. Also the extended time that children spend in the interview when they draw or re-enact aswell as verbalise their recall may account for the increase in quantity of recall. Finally drawing and re-enacting during an interview may provide children with more relevant and effective retrieval cues, thus increasing recall.

In a recent experiment Salmon and Pipe (2000) compared the impact of including props, drawing and a prior interview on children's recall of an event which occurred one year ago. Children experienced a health assessment at age five to six years and so when they were interviewed in this experiment they were six to seven years old. Drawing was found to be a less effective method of aiding children's recall than providing children with props during

the interview. Children spent the longest amount of time during the interview when they drew, suggesting that the duration of the interview is not indicative of the detail or accuracy of recall. The authors suggested that drawing "may act as a personal retrieval cue when the event is highly distinctive, but when the event is more familiar it cues general gist memories or scripts which result in an increase in errors" (p. 115). This suggests that the benefits of including drawing during an interview may only be felt in the short term.

The review of the literature on drawing during the interview identified a concern and a gap in the literature, which makes it inappropriate to form any conclusions about the effects of drawing during an interview. All of the studies that investigated drawing as an aid to recall in an eyewitness context involved questioning about events that had actually taken place and included relevant questioning. As Pipe and Wilson (1994) noted when investigating the influence of irrelevant props on recall, it is important to identify whether children who draw during the interview remain accurate even when questioning is concerned with events that never took place.

Drawing is often associated with children's play activity, and so can often have imaginative and fantastical content. When children are asked misleading direct questions they can often be inaccurate. These findings led to the first research question: When children draw during an interview does this accentuate inaccurate

responses or negate them? Conclusions about accuracy cannot be made without data to indicate whether children will be accurate when they are asked questions about events that never took place.

Children may be more resistant to misleading questioning when they draw during the interview because they may feel more in control of the interview process and be more confident to correctly deny the misleading information. However it may also be the case that the drawing process will result in more inaccuracies from the child as the drawing process encourages them to become more fantastical and therefore inaccurate in their responses. This gap in the research is addressed by pilot experiment 1 and experiment 2.

2.4 Aim 2: Post Event Information

Elizabeth Loftus and her colleagues (Loftus, Miller, & Burns, 1978) first introduced the post event information (PEI) methodology, now used widely in the eyewitness testimony literature. PEI methodology is used to investigate the accuracy of recall when information has been encountered following the event in question, as is often the case with real eyewitnesses. There are a number of ways in which post event information can be encountered, one of which is through suggestive questioning. The Loftus, Miller, and Burns (1978) study for example, had adult participants view a series of slides depicting an automobile accident. Half of the participants saw a 'stop' sign during the presentation and half saw a 'yield' sign. The participants were then asked questions about the accident;

one of the questions implied that there had been either a stop or a yield sign. Participants either had PEI consistent with the original event or inconsistent PEI. Those who received consistent information were the most accurate; the repetition in the question seemed to enhance their memories. Those given inconsistent or misleading information were more inaccurate and incorporated the suggestion from PEI into their memory of the original event. The authors concluded that it was possible to change memories of an original event by providing erroneous information during PEI, this is widely termed the 'misinformation effect'.

This study involved a two-stage procedure where an original event was shown and then participants were questioned about that event. The suggestive information was embedded in the interviewer's question. Data from these studies have led researchers to form conclusions about the accuracy of children's recall. But how can this be memory when the information presented after the original event has never been separately encoded? The procedure has since been modified to include a stage where information presented after the original event is shown to participants and encoded separately before the questioning stage. The modified procedure involves three stages; firstly the original event is presented to participants, then post event information is shown and this usually contains misleading information, finally participants are questioned about their memory for the original event.

Using this method, research has focussed on whether people recall information presented during the PEI stage when they are asked questions about the original event instead of their memories of the original event. In later studies (Loftus & Pickrell, 1995) it has been shown that adults can be vulnerable to suggestions that they were lost in a shopping mall when they were children, and that they come to report the incident as a memory. When the adults are asked, they report that they actually believe in what they are saying, as if a new childhood memory has been implanted. Although there were only 21% of adults affected in this study, the prevalence of this effect raises concern in the applied field. The implications of someone confidently and with absolute belief reporting events that have been 'created' by some encounter with erroneous PEI, could cause major miscarriages of justice (Banks & Pezdek, 1994).

The misinformation effect can occur by more subtle means; through repeated retrieval. Roediger, Jacoby and McDermott (1996) had participants view a slide show about a crime, and then listen to misleading information about the crime in a PEI story. During the first recall test instructions were manipulated to vary the likelihood that participants would recall the information presented during PEI. On the second recall test participants were asked cued questions and were instructed only to recall information that they remembered from the original event. If participants had reported the erroneous information in the first recall test then they were more

likely to recall and to report that they remembered that specific incorrect information during the second recall test. Roediger and colleagues (1996) concluded that a substantial misinformation effect occurs in recall and that a repeated interview increases this effect. Wright, Varley, and Belton (1996) found different results in their study about second guesses. Adult participants were more accurate when they made a second response. Misleading participants did not eliminate this effect.

Pezdek and Greene (1993) noted that many of the experimental studies investigating the misinformation effect involved similar modalities; most have a visual presentation of the original information and then a verbal description of the PEI. They suggested that due to the task demands of verbal memory being the same during the interview, participants may be more likely to recall the information presented during the PEI stage. They found that visual recognition memory was more resistant to the misinformation effect than verbal recognition. The strength of memories also had an effect on the likelihood of them being affected by PEI (Marche, 1999). In a series of experimental studies Frost and Weaver (1997) manipulated the encoding time of the original event and concluded that there were larger misinformation effects when the encoding time was short, although the misinformation effect was present for events that had a longer encoding time.

Recently there has been speculation that the results from PEI studies can offer some insight and explanations into the false memory debate. There have been many recent cases (State vs Romoma in Ceci & Bruck, 1995) where a client has discovered during therapy (usually for something unrelated) memories of childhood sexual abuse (CSA). Clients in therapy may be more vulnerable to the suggestive techniques used by a therapist and come to believe that the events described are actual memories from childhood (Loftus, 1998). Hyman and Billings (1998) found that higher scores on the Creative Imagination Scale (CIS) and the Dissociation test (DES) were highly correlated with false memory creation. There is a lot of doubt about whether these recovered memories are accurate and should be believed at all, let alone whether people should be convicted for crimes based on testimonies containing these types of memories (Loftus, 1998).

Therapists are vulnerable to biasing and to engaging in activities such as imagining situations and dream work etc. There is little experimental evidence that supports the use of these techniques and if false memories are created by this type of activity then therapists could be severely limiting the search for child abuse memories by concentrating their efforts on clients with no such memories (Loftus, 1998). The malleability of memory is supported by the PEI evidence, and, as Hyman and Billings (1998) conclude, memories are reconstructed to fit one's current view of oneself.

External stories may also be adopted as personal memories or frequently told family stories that we now accept as memories.

2.5 Theoretical explanations

Elizabeth Loftus (1979) explained the misinformation effect by proposing a trace-decay theory. Essentially she believed that the information encoded during the original event decays and is therefore less likely to be recalled than the PEI, which overwrites the information in the original event and is recalled at the expense of the original information. This theory assumes a single trace model of memory and is based on the assumption that the more recent the information, the more likely it is to be remembered.

It is unlikely that the memory system is as simple as this single trace model assumes. The more popular and recent theories make use of a dual model of memory, assuming that traces can coexist in memory. The modified recognition test in which an unseen foil is included during PEI (McCloskey & Zaragoza, 1985) was designed to distinguish between the blend type explanation of the misinformation effect and the coexistence theories. Mc Closkey and Zaragoza (1985) concluded that the original memory trace was not damaged as participants correctly recalled the original information more than the unseen foil. Their conclusions were strongly criticised by Loftus, Schooler and Wagenaar (1985) because they believed that the method was not sensitive to memory blends; i.e. the original and unseen foil will be more dissimilar than the misinformation

alternative, and will therefore not account for blends between the two memory traces. This argument continues.

The most recent theory that was proposed by Ayers and Reder (1998) is based on an activation based semantic model of memory. It is based on the assumption that concepts are formed in memory when information is encountered, and that the likelihood of whether this information is recalled depends on the strength of activation of the concepts and of the connections between concepts. Activation of a concept can be affected by its recency or frequency of encountering, or by the activation of other contextual concepts existing in memory. In terms of the misinformation effect, when participants encounter the original event the information encoded here forms contextual concepts in memory. During PEI the majority of the concepts receive further positive activation as they are repeated, the connections between them also receive positive activation. Erroneous information about a target included in PEI forms a new concept and new connections to the repeated original information. It follows that the incorrect target from PEI will be recalled, as it and its connections to the other original information were more recently activated than the original target.

There are several other theories that have been proposed to explain the misinformation effect and I will only briefly cover them here. Fuzzy-trace theory (Brainerd & Reyna, 1998) is based on the assumption that both gist and verbatim memories are represented

in memory. Gist memories are surface type memories and verbatim memories are the specific items present within a particular event. A gist memory could be described as a 'shopping trip'; verbatim memories would be required if someone were to distinguish a particular shopping trip from another. Verbatim memories fade over time as the memory system infiltrates information that is not often required and the remaining gist memory can be highly inaccurate due to its lack of specificity. The misinformation effect may be a result of participants recalling gist memories; children are especially prone to relying on these memories and then to gap-filling the specific information.

A source monitoring account of misinformation was proposed by Lindsay and Johnson (1987). They suggest that misattribution of source can occur 1) when the source of the original information does not exist in memory due to decay or to lack of encoding and participants generate a plausible but incorrect source for their memories, or 2) participants respond on the basis of familiarity with a cue and not with source information. There are many examples of people having difficulty determining the source of their memories, especially when information is repeated or is similar in content (Johnson, Hashtroudi, & Lindsay, 1993). Considering PEI methodology, information that is presented during the original event and during PEI may share similar characteristics and is encoded visually and audibly regardless of its presentation form. The recall of PEI instead of the original event can be explained by a

participant having difficulty discriminating the source of their memory rather than a reflection of cognitive impairment.

Finally the modified recognition test (McCloskey & Zaragoza, 1985) was also used to address the possibility that task demands are the main cause of the misinformation effect. Essentially the argument involves participants reporting PEI even though they have intact original memories because they believe this to be required.

2.6 Making memory less accessible

The studies that I have reviewed above show that it is possible to implant new memories about an event and to change the details about an event in both children's and in adult's memories. But what about making memories less accessible? It follows from the findings in the PEI literature that if participants have PEI that suggests that certain events did not happen then these events may not be reported during recall. This is an important research question both theoretically and in terms of application. Theoretically it will help us to understand memory processes more fully. In terms of application it allows us to speculate about and be aware of a potential reason that some information is not reported during interviews.

Only a single study has to date appeared in the literature whereby PEI techniques were used to try to make memories of an event less accessible in children's recall. Pezdek and Roe's (1997) study contained PEI where a target event was denied to have occurred. They explored the relative ease of implanting, changing and "erasing" the memory of an event involving a touch in children

aged four and ten years. Children viewed a series of slides and were either touched or not touched during the presentation of a particular slide. The PEI consisted of a review in which (a) it was suggested that the children were touched when they were not, (b) a different touch to the original was suggested or (c) it was suggested that there was no touch. Children's recall to questions about these targets was compared to controls. It was noticeable that all of the effects were in the predicted directions; accurate memory of the original event was slightly lowered when attempting to add, to change or to erase memories. However the change condition was the only one to reach statistical significance and the authors concluded that it was easier to change a memory than to implant or to erase a memory.

The majority of the studies included in this thesis extend the idea of making a memory less likely to be reported using PEI methodology. In their study Pezdek and Roe (1997) attempted to 'erase' the memory of a touch by presenting PEI in which they suggested that the target scene had not occurred. I believe that the mere suggestion that something did not happen may have triggered the children's memory for that scene. Pezdek and Roe's (1997) study did not contain an omission condition where the target scene was simply omitted from a PEI review; and as it will become clear the demonstration of a strong effect of PEI omission on recall fills this gap in the research.

2.7 Aim 3: Confidence

Confidence in a response does not predict the accuracy of that response (Wells & Murray, 1983; Bornstein & Zickafoose, 1999), although witnesses are much more likely to be believed if they appear confident (Sutherland, Gross, & Hayne, 1996). The literature on adults' confidence accuracy (CA) relationship suggests that when adults report their own confidence levels, there is a trend towards them being overconfident (Bornstein & Zickafoose, 1999). The method used to assess confidence in the adult literature involves participants completing questionnaires or self-reporting their confidence. There are many problems associated with this method, not least in participants having different levels of interpretation or being reluctant to disclose information.

Assessing confidence in children is a difficult task. Children may view a prompt for confidence by an adult as the need to please the experimenter, and be prone to a "high confidence" response bias. An extensive literature review did not divulge an appropriate way for me to assess children's confidence and this gap in the literature provided us with an opportunity to devise an age appropriate confidence scale.

Children can be reluctant to admit that they do not know an answer and frequently provide incorrect responses instead (Robinson & Briggs, 1997). Giving children permission during the instruction phase to report that they do not know an answer can lead to an increase in the accuracy of their reports (Nesbitt &

Markham, 1999; Memon, Holley, Wark, Bull, & Kohnken, 1996). Primarily the confidence scale was included to allow children to report that they did not know the answer to a question by physically indicating that they had no confidence in their own response. An age appropriate confidence scale was developed for the experimental work to assess the children's confidence-accuracy relationship.

Section 3: Current Research on the Child Witness

3.1 Cognitive factors affecting the child witness

This section is concerned with some of the research that is currently being carried out on the cognitive abilities of the child witness. It is not directly linked to the experimental aims of the present work, but it is an extremely important consideration in the designing of eyewitness experiments. Eyewitness experiments usually involve the simulation of an interview situation. There are potentially many confounding factors, such as encoding ability, retrieval ability and linguistic ability. In designing experiments every effort should be taken to ensure that the influence of these factors is kept to a minimum by taking guidance from the existing literature.

3.2 Encoding and Retrieval and Linguistics

Encoding of an event is an important factor when investigating children's capabilities as eyewitnesses (see Brainerd et al, 1990, for a review). One of the most influential factors in encoding is having "prior knowledge" and being able to make

sense of events experienced (Ornstein, 1995). Children generally have less "prior knowledge" and therefore it follows that their encoding ability will be poorer than adults'. However it has been shown that children can perform well on memory tests when they have expert knowledge about a subject, suggesting that they are proficient at encoding information (Gobbo & Chi, 1986).

The time available may also influence how well an event is encoded. This can be true for both children and for adults. For example in their study Frost and Weaver (1997) manipulated the time available for the encoding of an event that young adults were later questioned about and found that a shorter encoding time produced large misinformation effects. This suggests that the time available for encoding influences the amount of information recalled rather than encoding ability per se. Children may indeed require a longer time to encode information successfully, and if the time available was adjusted to equate adults' and children's encoding ability then performance in recall may be similar for children and adults (Ornstein, 1995).

Other researchers believe that children's memory capabilities are not a reflection of poor encoding ability, but of poor retrieval abilities (Ornstein, 1995). For example Fivush and Hammond (1990) found that children who experienced an event at age two and a half years recalled more accurate information about that event when they were questioned at age four years than they had recalled immediately following the event. It has also been

suggested that children may encode information differently to adults, and that it is not until information is encoded using language that we can also expect information to be recalled using language. Peterson and Rideout (1998) compared young children's (13-18 months) memory of a medical procedure in five different interviews over two years. They found that 'older toddlers' (mean age = 21.2 months) who could not narrate about past events at the time of the medical procedure recalled target events eighteen months later when their language skills had improved.

The linguistic capabilities of the child witness should also be recognised as a possible reason for children's reduced recall. It has been noted that some of the legal terminology used in the courtroom is too difficult for young children to comprehend (Saywitz, Janeicke, & Camparo, 1990). The authors found that children aged five to six years were particularly prone to making homonym errors and that they were mostly unaware of their insufficient knowledge, whereas older children would admit that they had lack of knowledge of certain words or phrases. It is not until the age of about six to seven years that children fully develop the ability to see the world and to communicate using another person's perspective. This is an issue often overlooked despite the majority of experimental work involving participants watching or listening to an event and then being questioned about it evoking third party recall which relies on the ability to report from another person's perspective. More recent research involves participants

taking part in an event and therefore evokes recall that is reported using first person pronouns.

It follows that an adult may put their own adult interpretation on what a child witness has told them during testifying and consequently it is easy for children to be misinterpreted (Sutherland, Gross, & Hayne, 1996). There is still a debate over whether young children's poorer performance as witnesses originates from encoding or linguistic issues (Peterson & Rideout, 1998).

3.3 Schema Theory

The schema theory first introduced by Bartlett goes some way to explaining why some things are remembered whilst others are forgotten. Memory is influenced not only by our present experiences but also by information that is already stored in our memory. The knowledge that we have already stored in our memory is organised according to schemas. Schema guides the selection of what is stored and remembered; for example, one may not remember the clothes that were worn when an exam was taken because the clothes are not relevant to the activated schema of exam. Information stored in schema form may undergo a transformation from the specific to the more general, again providing an explanation for why certain things from an event may be forgotten. Memories may also become normalised over time so that the schema holds only information that is most representative of a certain experience; this is especially true for events that are commonly experienced.

The evidence from schema theory can provide explanations about how memories are retrieved, but more appropriate for this discussion, about how memories come to be forgotten. The downfall of this theory is that it remains unclear whether the processes take place at the time of encoding, storage or retrieval. In a pioneering experiment investigating this Anderson and Pichert (1978) concluded that Schemas have an effect at both the encoding and retrieval stage as new schema provided to participants only at the retrieval stage can increase recall beyond that of participants who are not presented with any new schema. A further criticism of the schema theory is that it is too vague and that it does not account for those memories that people have that are odd or unusual (Cohen, 1993).

3.4 Other Influences

So far in this section I have concentrated on some of the cognitive factors that may account for children's poorer performance as eyewitnesses. There are a number of other factors that are potentially confounding and that should be considered when designing eyewitness experiments. In this section I will briefly discuss the effects of repeated questioning and repeated experiences, questioning technique, time delays, stereotypes, type of event, stress and emotion, and confidence, all of which have been found to have an effect on the accuracy of children's testimony. The literature on each of these areas is vast and the scope of this thesis does not allow for much detailed elaboration.

3.5 Repeated Interviews / Questioning

In some of the experiments included in this thesis, children are required to respond to repeated questioning. There has been extensive research concerned with the effects of repeated interviews and repeated questioning. It is a realistic consideration as witnesses are often interviewed many times after an event. This section highlights some of the main concerns of question and interview repetition.

In eyewitness situations children are usually subjected to multiple interviews by multiple interviewers. There is a large body of literature that has focussed on the effects that this can have on children's recall. Some researchers have recommended to the legal system that the number of times a child is interviewed should be strictly limited (Poole & White, 1995). The main risk with repeated interviewing is that errors that are made during an initial interview may be repeated in subsequent interviews (Roediger, Jacoby & McDermott, 1996). There is also evidence to suggest that a large proportion of information that is newly recalled in interviews after a long delay may be inaccurate (Salmon & Pipe, 1997).

However there is little doubt in the literature that discussing an experience can improve the ability of children and adults to recall it in later interviews. In their recent study Salmon and Pipe (2000) found little differences in the inaccuracies children reported in interviews three days after the original event and the errors reported one year later. Studies focussing on basic memory processes reveal

three main reasons for this (see Poole & White, 1995). Firstly the repetition of information may serve to inoculate against forgetting (Baker-Ward, Hess, & Flannagan, 1990). Secondly a repeated interview may provide the opportunity for reminiscence. Finally children may learn to engage in memory talk with the aid of repeated conversations. Hudson (1990) described this as children's focus changing from answering the adult's questions to actively remembering and offering information. Dent and Stephenson's (1979) data concerning the effects of repeated interviews over a two month period led them to conclude that children who participated in earlier interviews report more correct information without increasing the amount of inaccurate recall; a view that is shared by many (Poole & White, 1995). Dangerously this has led some police interviewers to form the opinion that the more interviews a child has, the more information will be recalled.

It appears then that it is not the number of interviews that a child is subjected to per se that defines whether multiple interviews will increase the inaccuracies in children's testimonies. It is more likely the case that other factors during the interview, for example the question type, the inclusion of misleading questions and the interviewer style influence the results of studies that have focussed on looking at the effects of repeated interviewing. Indeed after an extensive review of some of the studies investigating repeated interviewing Poole and White (1995) concluded that "early interviews if properly conducted, can consolidate memories for an

event without introducing errors into their testimony" (pp. 29). The important phrase here is "*if properly conducted",* I shall now look at the interview process in more detail and identify some of the potential influences on children's performance in eyewitness situations.

3.6 Questioning

There is a substantial amount of research that focuses on the type of questions that are asked during an interview and the effects that this can have on the accuracy of recall. It is important to be guided by the research on questioning, as all of the experimental work involves questioning children; this is not what our experimental aims are concerned with and therefore experiments need to be designed to minimise any effects on recall of questioning. The distinction between question types is an important step in narrowing down the interview process and identifying the optimal way to interview both children and adults. Left without structure the differences between interviewers and the questioning techniques used are vast (Dent, 1982, in Goodman & Bottoms, 1993). There are three types of questions that are frequently asked in interviews: free recall questions (e.g. Can you tell me everything you can remember about your visit to the station?), open-ended questions (e.g. What happened when the man came into the room?) and specific or direct questions (e.g. Was the man wearing a hat?).

It is a common finding that children often provide accurate testimony when they respond to a free recall prompt, although

often their testimonies are skeletal. The quantity of recall increases when children respond to direct questions or recognition type questions, but so does the number of inaccuracies in their reports.

Many of the questions that are asked in real life interviews with children and adults are of a suggestive nature and may contain leading information. This type of questioning has an extensive effect on children's recall. For example in the Kelly Michaels case interviewers used leading questions on thirty percent of occasions, such as:

"Q: When Kelly kissed you, did she ever put her tongue in your mouth?

A: No.

Q: Did she ever make you put your tongue in her mouth?

A: No.

Q: Did you ever have to kiss her vagina?

A: No.

Q: Which of the kids had to kiss her vagina?

A: What's this?

Q: No that's my toy, my radio box. Which kids had to kiss her vagina?

A: Me. (Bruck & Ceci, 1995, pp. 280).

The damage that this type of questioning can do is alarming and is present in many other real life cases where miscarriages of justice have occurred (Ceci & Bruck, 1995).

When suggestive questioning is used the effect is universal across age groups. Too much concern about suggestive questioning with children may be misplaced, as children over ten or eleven years may not be more susceptible to suggestion than adults (see Batterman- Faunce & Goodman for a review, 1993). In fact Gudjonsson and Clark (1986) assert that suggestibility is a function of a dynamic relationship between the person the environment and significant individuals within that environment. Again it is difficult to isolate suggestive questioning techniques as the cause of children's inaccuracies. For example, in the extract from Kelly Michaels case detailed above, there is a clear possibility that the child finally agrees with the interviewer because they no longer understand the meaning of the question.

There have been few researchers that are more devoted to advocating the capabilities of the child witness than Gail Goodman. Much of her work originates from her desire to discover whether non-abused children will make false claims about sexual abuse. Her more recent work is conducted out of the laboratory and is extremely ecologically valid, and it presents a much more optimistic view of children's capabilities. In one study young girls (3-5 years, and 5-7 years) were questioned about a medical examination (Goodman & Clarke-Stewart, 1991) and they were asked suggestive and non-suggestive questions. The older children were more accurate in answering both types of question, but importantly there were very few differences between the ages and

the children's resistance to the suggestive questioning about events involving their own bodies. (But also note the Kelley Michaels case where children reported bizarre sexual abuse, (Bruck & Ceci, 1995))

3.7 Type of Event

The nature of the event about which children are questioned can have an effect on the accuracy and the detail of their testimony. This was an important consideration in the design of my experiments because I wanted to reduce the effect of the type of the event, but also to ensure that the data remained as applicable as possible. Most of the early laboratory based experiments involved children watching an event on videotape or listening to stories, that they were later questioned about, thus evoking third party recall from participants. These early studies were heavily criticised (see Bruck & Ceci, 1999 for a review) because most involved questioning about neutral events with little personal relevance. It was too much of a leap to assume that children who are victims or witnesses would provide recall analogous to recall of neutral information considering events that are unique and personally relevant, can evoke strong emotions.

It became clear to researchers that to understand and make predictions about children's capabilities we must conduct research that is as closely related to real life situations as possible. In recent years this has been the case. Much of the research that is now conducted is more ecologically valid, and is designed to investigate children's witness capabilities in response to questioning

about personally salient events, that involve bodily touching and or insinuations of abuse.

As I have already mentioned Gail Goodman has been influential in the changes to methodology that have recently taken place in the eyewitness literature. Her studies, questioning children (usually in the age groups 3-5 years and 5-7 years) about painful and or personal medical experiences have confirmed that children are generally accurate during free recall, and that they can be accurate in response to questions that involve their own bodies (Goodman & Clarke-Stewart, 1991; Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1994, Goodman, Bottoms, Schwartz-Kenney, & Rudy, 1991; see also Ornstein, 1995)

There has been an increase in studies that involve the child taking part in the original event. This has benefits in maintaining experimental control over the event that children are questioned about, and also allows for children to report from their personal experience, thus increasing the application possibilities (Butler, Gross, & Hayne, 1995; Leitchman & Ceci, 1995; Gee & Pipe, 1995). The optimism about the capabilities of the child witness that has occurred because of the change in methodology, suggests that the recent studies that implement real applicable events for questioning make it easier and more appropriate to apply to children's abilities as eyewitnesses.

3.8 Interviewer

The interviewer can affect the detail and the accuracy of children's testimony, this was an important consideration in the design of the experiments in this thesis, as it was important to ensure that the results were not a reflection of the interviewer's influence. Interviewer bias occurs when interviewers have prior beliefs that an event happened or did not happen and consequently shape the interview in a direction intended to elicit consistent information from the interviewee, (Bruck, Ceci, & Hembrooke, 1998). Experience is not always indicative of an 'effective' interviewer. Dent (1982, in Goodman & Bottoms, 1993) compared the recall elicited by children who were interviewed by either experienced or inexperienced interviewers, and found that the experienced interviewers elicited more correct information, but also more incorrect recall, because they tended to ask more suggestive questions (see also Petit, Fegan, & Howe, 1990, in Bruck & Ceci, 1995). In the real world where experience is looked on favourably the consequences suggested by these data are extremely worrying.

Interviewers can hold a stereotypical view (maybe if they already suspect the perpetrator), and they may bias the interview in this way. Leichtman and Ceci (1995) conducted a study in which a confederate (Sam Stone) came into a classroom and enacted a scripted event. Children aged three to four years and five to six years who were exposed to a neutral adult who talked about Sam Stone being clumsy and bumbling around made more errors in

recall ten weeks later. In their recall the children included information consistent with the stereotypical information that the neutral adult had supplied prior to the interview. Younger pre-schoolers were more inaccurate than older children.

Stereotype inducement is also present in many 'real life' cases. For example in the Kelly Michaels case children were repeatedly asked questions during repeated interviews that included the suggestion that Kelly was 'bad'. Even when the children agreed that she was 'bad' it is unclear whether they are referring to Kelly doing bad things, or whether the reports were a reflection of children incorporating the stereotypical information provided by the interviewer (see Bruck & Ceci, 1995,). The effects of stereotype inducement can be devastating, consider the following case. In 1987 a man was sentenced to death row largely based on a child's testimony (Texas v. Macias, 1987, detailed in Leichtman & Ceci, 1995). It was apparent that the child in this case had been exposed to negative stereotyping of the man in question from her Mother. The child was subjected to repeated and highly suggestive interviews and told police that she was certain of the perpetrator, a statement she later retracted. The man was later released twelve days before his scheduled execution.

The atmosphere created by the interviewer can also be classified as a type of interviewer bias. If the atmosphere created is too hostile and children do not feel comfortable then inaccuracies increase as the child tries to please the adult interviewer (Saywitz,

1993). Even though there can be devastating effects from a hostile atmosphere, a highly supportive environment with an encouraging interviewer can easily escalate into interviewers inadvertently praising 'correct' statements, and selectively ignoring statements that don't conform (Bruck et al, 1998). Interviewers can also be tempted to bribe children into providing them with certain recall.

Interviewers are adult strangers to children, they also often hold a position of authority, and wear a uniform i.e. police, lawyers, social workers. This can be intimidating for children and can induce them to believe that the adult already has the answers and that their job is to provide the 'correct' answer, and not necessarily report from their memory. As one girl admitted: 'I thought they wanted me to be certain, so I said I was certain even though I wasn't. .... I answered questions I wasn't sure about because I wanted to help the adults' (Texas v. Macais; in Leichtman & Ceci, 1995). Experimental evidence confirms these trends; Tobey & Goodman, (1992) compared the recall of children who were interviewed either by a policeman or by a neutral interviewer. Children provided less detail and more inaccurate statements in their recall when the policeman interviewed them.

As it will become clear the issues that I have discussed in this section are not necessarily what the experimental work is concerned with directly. However when designing eyewitness experiments all of the issues discussed in this section must be taken into account. There are so many factors to control for and consider

that it becomes important to ensure that the interview provides children with the optimum conditions in order to reduce the effects of confounding factors and isolate the effects on recall that the main issues under investigation have.

Section 4: Improving Children's Testimony

This section is concerned with improving children's testimony and reviews some of the research that is dedicated to optimising the interview process to ensure children's potential as accurate witnesses is achieved. Two of the experiments in this thesis require the use of recall aids to assess the accessibility of memories. Anatomically detailed dolls were considered, and a section in the appendix (appendix 1) details some of the concerns that are the reason that they were not included. Object props and picture cues were used as recall aids and this section reviews the literature on these two recall aids. Appendix 2 is included for reference, and details the effects of questioning and the cognitive interview, both of which influenced the design of the structure of the interview and the type of questions included in this experimental work. The literature available is much more diverse than I can give credit to, and again all of these factors should be considered when designing eyewitness experiments.

4.1 Props

In an attempt to increase the detail and the accuracy of children's testimony many researchers have advocated the

introduction of props to an interview situation. An experiment included in this thesis includes the use of props. Children are more reliant on external retrieval cues when recalling information (Ceci & Bruck, 1993). The provision of props in an interview could provide children with the structure on which to base their recall and therefore act as a retrieval cue that is not adult generated. It has also been suggested that the content of children's recall will be more detailed when props are provided as props can elicit general event knowledge as well as knowledge of specific episodes (Gee & Pipe, 1995). There may also be many social benefits from the inclusion of props during an interview. Props may allow children to recall information that they may otherwise have difficulty saying, thereby reducing linguistic demands and conversational constraints. Props may also make children feel more comfortable and in control of the unfamiliar interview situation.

In a series of studies Mel Pipe and her colleagues examined various aspects of the inclusion of props during interviews. In all of their studies they had children interact with an experimenter in a magic show, the event was standardised across children and was interesting and novel for the children. Children were interviewed ten days and ten weeks after the event, a delay that is realistic in the context of eyewitness interviews in the real world. The first study (Wilson & Pipe, 1989) examined whether having object cues in view was more effective than providing verbal cues. The study had a relatively small sample size of only twenty-four children resulting in

weak effects. There was relatively little information recalled after the 10 day delay, and the presence of object cues during the interview had little effect on recall. However after a delay of ten weeks the children benefited from the presence of object cues and provided more information in response to a cued recall prompt.

In a further study (Gee & Pipe, 1995) using the same methodology but with a larger sample of children (50 children aged 6 years and 40 children aged 9 years), age effects and the influence of props during an interview were investigated. The authors found that object cues closed the age gap in recall, and increased the accuracy of responses, but that the number of errors increased after a longer delay. The authors also noted that when instructions to attend to the props were given to the children prior to questioning there was a beneficial effect on recall particularly for the younger children. In a follow up study one year later children were interviewed again (Pipe, Gee, Wilson, & Egerton, 1999). There was a general increase in information when props were present during the interview compared to no props, and information repeated across interviews was accurate. When children were directed to attend to the props recall was maintained but prompting these children led to a decrease in accuracy.

Despite these potential cognitive and social advantages concern has been expressed over the use of props during interviews (Pipe, Gee, & Wilson, 1993). Concern arises mainly from the data on the use of anatomically detailed dolls (see appendix 1). Young

children may find it difficult to see the relevance of the object cues and have difficulty equating and representing them to the event in question (DeLoache, 1990). Another major concern is that interviewers are often unaware of the exact details of the event they are asking questions about; the inclusion of some props may be inappropriate. The inclusion of irrelevant props may distract children and encourage more fantastical responses from them, and the inclusion of props present at the time of the incident may have multiple associations and also encourage children to recall information that is not concerned with the event in question (Goodman & Aman, 1990).

In real life eyewitness situations the interviewer often has suspicions about what has happened, but is naïve to the exact details. The inclusion of props in real world interviews will therefore often include irrelevant cues. Pipe and Wilson (1994) investigated whether this would lead to children being vulnerable to suggestibility and therefore encourage them to provide inaccurate recall. The results of the study, which followed the same methodology as the previous two (the magic show), suggested that the presence of irrelevant retrieval cues did not mislead the children into making more errors. The authors suggested that ".. cues may not only be useful, they may also be a safe means of facilitating recall" (p. 37).

Salmon, Bidrose, and Pipe (1995) compared the use of toy and real props in interviews with children aged three and five years.

Children took part in an interactive event in which they examined a sick teddy bear with the experimenter, some of the actions performed on the teddy were also performed by the child on the experimenter and vice versa which increased the ecological validity of this study. Both toy and real props elicited more information overall from both age groups compared to the no props condition. For five year olds both verbal recall and behavioural re-enactment increased with the inclusion of props, for three year olds only re-enactment increased. The main finding of this study however is that children who are interviewed with toy props provided more inaccurate information than the real or the no props condition. The children included in this study were interviewed again after a delay of one-year (Salmon & Pipe, 1997). Now aged four and six years the effect of the inclusion of props during the interview yielded similar but much smaller effects than the original data. The children interviewed with props produced the most information. Children interviewed with toy props produced marginally more errors compared to those interviewed with real or no props. In a further experiment where children were interviewed three days and one-year after a medical examination, the inclusion of props during the interview did not facilitate the detail or the accuracy of children's testimony (Salmon & Pipe, 2000). The authors suggested that the reasons for the lack of replication were because the props included at interview were prototypes of the original and

may not therefore have provided sufficient contextual cues to aid recall.

It seems that the provision of real object cues during an interview with children can increase the detail of their recall without increasing the number of inaccuracies. For younger children the inclusion of object cues should be accompanied by instructions from the interviewer to attend to the cues in order to enhance recall. In real life eyewitness contexts this could have extremely positive results for interviews with children as early indications reveal that even when irrelevant cues are present during an interview children resist the temptation to be misled into providing false information.

4.2 Picture Cues

Photographs and pictures are often used by police for identification purposes during interviews with witnesses. There is a vast literature regarding this topic, particularly concerning the visual aspects of face recognition and identikits. However the scope of this thesis does not cover these issues and focuses primarily on the use of photos or pictures as retrieval cues with children in an interview. In a study with pre-schoolers who played a fishing game and were interviewed ten days later, photos were introduced into one of the conditions. Children recalled more correct information when they had photos present in the interview compared to a control group (Aschermann, Dannenberg, & Schulz, 1998).

There are no studies that use blurred picture clues and employ an eyewitness rationale. This method is included in one of the experiments in this thesis. The important considerations of using picture clues as an aid to recall in an interview with children are to ensure that children can attend to and have the ability to recognise the content of pictures. Children as young as three years show perceptual priming effects when they are required to recognise blurred pictures (Drummey Bullock, & Newcombe, 1995). Children are also able to recognise the content of pictures that are shown in blurred form and then become progressively clearer (Potter, 1966). Potter's (1966) work on perceptual recognition identified certain ages when children become more efficient at recognising information. Age four to five was notably the age where the greatest increase in recognition speed of pictures occurred. At this age children are proficient and generally accurate in recognising and naming both fully focussed and blurred pictures.

Some innovative techniques have been suggested and tested that aim to reduce the need for leading questions and strengthen children's resistance to suggestive questioning. Narrative elaboration is a technique involving the use of pictorial cue cards which act as a mnemonic device during the questioning phase of an interview, (Saywitz, Snyder, & Lamphear, 1990, in Saywitz, 1995). Children receive training in the use of narrative elaboration and the emphasis is on them using the cards to remind themselves to report as much as possible. One of the advantages of this is that the

children's recall is self directed and does not depend on an adult structuring the content of what is being recalled. A possible criticism is that there are only five categories (participants, setting, actions, conversations/ affect and consequences). This may limit children's recall although ensuring a free recall stage of the interview should reduce this problem. When compared to interviews in which children are told to be accurate and complete, those children who have narrative elaboration training provide more information without a reduction in accuracy (Saywitz & Snyder, 1993).

Section 5: Summary and Outline of Experimental Work

To summarise, the review of the literature surrounding the child witness has identified two research questions that have been overlooked as yet and warrant investigation. Firstly, does drawing have a facilitative effect on children's recall during an interview, even when they are questioned about events that never occurred? Secondly, does the recall of a scene become less likely when it is simply omitted from a review of all of the other scenes in an event? In the experimental work it became clear that some of the issues arising could be dealt with by assessing children's confidence. There was no method that assessed children's confidence in recall successfully. An age appropriate confidence scale was designed and included in some of the experiments following.

5.1 Aim 1: The Effect of Drawing

It is inappropriate to make conclusions about the effectiveness of drawing on children's recall with the current data on the topic. All of the studies until now have involved relevant questioning about events that have taken place. Questioning in interviews is often concerned with suspected events and consequently includes irrelevant questioning. Pilot experiment 1 and experiment 2 investigate the effects that irrelevant questioning has on children's recall when they draw during an interview.

Pilot experiment 1 is included as a pilot study and investigates the effect of drawing on children's responses to questioning about personally relevant events that had occurred and that had never occurred. The assumption was that the 'real' events would be well encoded by the children. Children are generally accurate when reporting events that are significant to them. Pilot experiment 1 required parents' completion of questionnaires that identified events that their children had participated in and that had personal relevance. Children were then interviewed and asked questions about those events that had happened and about events that had never happened, with or without the aid of drawing in the interview.

Experiment 2 was designed to address the same question: whether children who draw in an interview have increased recall, and are resistant to misleading or irrelevant questioning. In this experiment a staged event was used and therefore the questioning was controlled. Relevant questions where the answer had been

shown during the original event were asked. Irrelevant questioning where the answer was implied but not explicitly shown during the original event were also asked. I was interested in whether children could be more misled when they drew during the interview and were asked irrelevant questions about the scripted event.

During the third year of my experimental work Bruck, Melnyk, and Ceci (2000) identified almost identically, the research question that I had asked at the beginning of this work. Their study looked at the effect of drawing on children's suggestibility and source monitoring. In their study drawing was included as a rehearsal device before the interview and not as a recall aid during the interview as in my experiments. Bruck and colleagues noted that the visual representation of drawing may serve to consolidate the memories of an event. Previous research indicates that when children are asked to consider, imagine or to recall events that are false they are more likely to report these as memories. They hypothesised that drawing false reminders about an event prior to an interview would lead to children recalling the false information during an interview. The results indicated that children were more likely to include true and false reminders in their free recall narrative if they drew prior to the interview. Children who drew in the interview were also less likely to accurately deny the questions about false reminders.

Bruck and colleagues (2000) concluded that drawing can be an effective rehearsal technique about true events, but that it has

negative consequences and increases children's acceptance of false information. As a result of these data, the expectations of pilot experiment 1 and experiment 2 are that children who draw during an interview and are required to respond to irrelevant questions will be more likely to answer incorrectly than children who verbalise only.

5.2 Aim 2: The Inaccessibility of Memories

Experiments 3 and 4 investigate whether children's memory of a scene from an event can be made less accessible by omitting that scene and covering it up with smooth editing during a PEI stage. Both experiments investigate whether this is possible when the children actually take part in the event and interact with the experimenter. In line with Pezdek and Roe's (1997) study a 'touch' was included as one of the target scenes in this study. Children have been shown to be resistant to suggestive interviewing techniques when questioned about personally relevant events, and events that involve a personal touch (Goodman, Bottoms, Schwartz-Kenney, & Rudy, 1991; Goodman, Sharma, Thomas, & Considine, 1995). However, it has also been shown that children are reluctant to talk about events involving a personal touch (Goodman et al, 1995; Rudy & Goodman, 1991), and that events involving a touch can be under reported by children (Bruck et al, 1998).

If it is possible to make a child's memory of an event less accessible by using the PEI method with an omission condition then

this would have important implications in terms of children's witness abilities. It may also provide some explanation to how children may be led to forget events. For example the results may provide more information about effective structuring of the interview process with the aim of accessing memories that have been affected by omitted information. The results may also provide a direction for researching child abuse situations, where touching is involved and an adult abuser fails to discuss it, thereby covering it up. When a child has been abused the abuse is not normally discussed by the child and another person, but the events surrounding the abuse may be. If I find that it is less likely that a child will recall a certain scene within an event when only that scene is omitted from a post event review, then this may provide us with an understanding of the situations in which a child fails to recall abuse. It may also provide us with valuable input for the false memory debate, and provide us with greater understanding of the child witness and their capabilities.

Wright, Loftus, and Hall (2001) conducted two studies in which they tried to inhibit adults' memories using PEI methodology. In the first experiment participants were shown drawings of a couple's dinner date, and were asked to re-draw each of the pictures. One week later participants were shown another set of drawings of the date, but with one of the scenes missing. In the second experiment, participants were shown a video of a drink driving incident. Later, participants were asked to imagine each of these scenes except

one. Participants' responses were compared to a control group who had no relevant information during PEI. In both studies, it was possible to make memories less accessible than the control group's memory by presenting PEI that described the overall event, but omitted the critical scene. Further, it was shown that this occurred for both free recall and recognition.

In the real world it is not desirable that children's testimony contains errors resulting from the omission effect. Experiments 4 and 5 address the issue of retrieving information that has become inaccessible as a result of the omission effect. In experiment 4 the original event and methodology follows that of experiment 3. The interview process differs, and includes an extra stage where props are introduced if a correct answer is not elicited. If the target memory is inaccessible then the provision of props may serve to activate connections to the target scene and encourage recall. The aim is to indicate how inaccessible the memories have become as a result of the omission effect.

The literature on the inclusion of props during the interview suggests that children can provide more accurate testimony, even when novel distracter props are included (Pipe & Wilson, 1994). It has also been shown that the inclusion of real object props produces more successful results on children's recall than toy props (Salmon et al, 1995). In line with the literature if children failed to recall the correct answer initially they were shown and directed to attend to an object prop that was present during the original event

and that was related to the target answer and were asked the question again.

Following an activation spread model of memory it can be assumed that if children fail to recall the target omitted memory initially, it may be due to the negative activation it and its connections to the remaining scenes receive. The provision of object cues that were present during the relevant scene may provide children with the contextual cue that will over ride the negative activation it has received from the omission effect and children may be more likely to recall this target scene.

Experiment 5 again aims to investigate the omission effect. In this experiment however the original event is changed. Children are not only victims of crimes they can also be witnesses. Being a witness is different, and the memories that are formed are third party memories which may not be personally relevant when the victim is a stranger, though they may be personally relevant if the victim is a loved one. It is important to identify whether these memories are also vulnerable to the effects of omitted information. The same scripted event was used in this experiment but instead of the children interacting with the experimenter and taking part in the event they listened to a story and were shown pictures of the original event.

In experiment 5 the depth of the inaccessibility of memories is also investigated by providing children with blurred picture clues during the interview. As the presentation of the original event was

visual, it followed that the clues should also be visual. The rationale was similar to that of experiment 4, in that any negative activation that the omitted scene received may be over ridden by the inclusion of picture clues during the interview

5.3 Aim 3: Confidence

In three of the studies in this thesis (experiments 2, 3 and 4) a further measure of children's confidence was taken. As previously mentioned currently there is no appropriate method of assessing children's confidence. An age appropriate confidence scale was designed and included to address this issue.

The reasons for including a confidence measure were two-fold. Primarily it was to allow children to report that they did not know the answer to a question when this was the case; something that they are often reluctant to do. Also it gave an indication about the subtle differences between the wrong answers. For example it provided a method of distinguishing between (a) incorrect answers recalled with the full knowledge from the child that the answer they have reported is incorrect, or (b) whether the child believes that the incorrect answer that they provide is correct which suggests that true forgetting has occurred.

The confidence scale was well understood by the children as will become clear further on in this thesis, and provided some convincing results suggesting that children have a degree of metamemory and the ability to report this knowledge when appropriate methods are provided.

Chapter 2

Investigating the use of drawing during the interview as a recall aid for children.

Overview

As we have previously identified there are currently mixed findings in the eyewitness testimony literature concerning the potential effects of including drawing as an aid to recall in interviews with children. The two studies included in this chapter investigate the accuracy of recall when children draw during an interview.

6.1 Pilot experiment 1

This experiment is included in this thesis as a pilot study for experiment 2. It also provides evidence of valuable lessons learnt through conducting the research process. Research is investigative by nature; it is important then to take some risks when designing and running experiments. One of the main skills to acquire is the ability to realise when a crucial design fault exists. This experiment includes too few participants to warrant inclusion as a separate study, but it reveals an ability to conduct and recognize cost effective research and is therefore included as a pilot study. It addresses the first of the initial research questions; Are children accurate in responding to false event questioning when they draw during the interview? It includes an older age group of children (7-8 years) and questioning

about significant life events that are identified by children's parents as having either occurred or not occurred during their child's life.

6.2 Introduction

When children are required to take part in an interview they may be treated in exactly the same way as an adult would be. Why should anyone expect a child to be able to communicate as accurately and effectively as an adult, in what is often a strange and unique experience for the child with an authoritative adult stranger? Perhaps as a consequence of the increasing amount of research on the child witness, suggestions and adaptations to the interview process have resulted in a more child - centered attitude in recent years. The results of studies that have addressed various improvement strategies including anatomically detailed dolls, toy and real props, context effects, interviewer style etc. have been previously discussed in the introduction. Our focus is on drawing during the interview and its effectiveness as a recall aid for children.

The arguments that I shall present for providing children the opportunity to draw during an interview focus around children's reliance on external retrieval cues, as well as some potential social reasons. A drawing produced by a child who is also providing verbal recall may act as an external retrieval cue generated by the child themselves, therefore the detail and accuracy of recall could be expected to increase (Butler et al 1995, Gross & Hayne, 1998). Allowing a child to draw during the interview may also have many

social benefits to a child; they may feel more comfortable and in control of the interview process.

However the evidence indicating that drawing is an effective recall aid in interviews with children is certainly not conclusive at this stage. The strongest criticism is that by allowing children to draw during an interview they may be more imaginative about what they recall and therefore increase the inaccuracies in their testimony. The present experiment is designed to investigate the nature of children's responses when they are questioned about events that never took place. If children are accurate in denying that false events never occurred then this would support the inclusion of drawing in interviews with children. However if children who draw during an interview provide more inaccurate recall about events that never took place than those who do not draw then this would expose a potential danger of the inclusion of drawing during an interview.

Butler and colleagues have consistently found that drawing facilitates children's recall in response to direct questioning only (Butler et al, 1995; Gross & Hayne, 1998). Davison and Thomas (2001) suggested that one of the possible reasons for Butler et al's (1995) positive result in the direct questioning phase of the interview could be due to the way in which they coded their recall protocols. Salmon and Pipe (2000) compared the effectiveness of drawing during the interview with the inclusion of props during an interview and a neutral verbal interview. Drawing was found to be less

effective than either verbal interviews or interviews with props in eliciting detailed and accurate testimony. The authors suggested that the main reason for this result was concerned with the one year delay and they concluded that "Drawing may act as a personal retrieval cue when the event is highly distinctive, but when the event is more familiar it cues general gist memories or scripts" (p. 115).

These mixed findings in the literature prompted the rationale for the current experiment. The concern was that the studies that have addressed the effectiveness of drawing as an interview aid in an eyewitness context have all been concerned with events that had actually taken place. Considering that children in real eyewitness interviews are often asked questions about suspected events that may not actually have taken place, there is a gap in the literature which investigates drawing as a recall aid. It is entirely possible that when children are drawing a picture and then they are asked about a 'false' event that they may be more likely to indulge in a fantastical approach and inflate their imaginations and subsequently produce incorrect recall. The existing data makes it currently impossible for us to draw any conclusions about the potential of drawing as a recall aid.

Bruck et al (2000) touched on this issue in their recent paper. Children participated in a magic show and were given true and false reminders about the event. Children were required to either draw the reminders or they were asked questions about the

reminders prior to the interview. The authors found that children's recall of the reminders increased for the drawing group for both the true and the false reminders. At a recent conference Gross & Hayne (2001) presented data from a study with a similar aim. In their study that looked into the potential pitfalls of the use of drawing in clinical and legal settings. They had children view true and false drawings before they experienced a related event. Children were interviewed and all children responded verbally to the experimenter's questioning regardless of their experimental condition. The authors concluded that although children in the draw group were accurate in responding to questioning about true aspects of the event, the drawers also included more of the false information in their subsequent reports.

Although these two recent experiments have highlighted some of the potential dangers of the use of drawing as a recall aid with children, they have concentrated on the presentation of drawings as reminders before questioning. I wanted to look at the potential dangers of the use of drawing as a recall aid during an interview when questioning is concerned with events that never took place. The events in this study were significant life events; the assumption being that the 'real' events would be well encoded. Children were asked about four events; two events that had occurred during their lives and two events that had never occurred. Parental questionnaires were included so that parents could identify

(a) the events that they thought their children would remember, and (b) events that had definitely not occurred in their child's life.

In addition to the well-documented developmental trend in encoding ability, there is also a body of literature that addresses the developmental trend in drawing ability. Luquet, (1927 no, 3) proposed that there is a change in children's drawings from intellectual realism to visual realism that occurs at about age eight to nine years. Freeman (1975) suggested that the change occurred at about seven years old, although there is now doubt about a fixed developmental trend (Krascum, 1996). Following this argument, children drawing from intellectual realism in a forensic interview may be tempted to draw about what their internal scripts tell them about an event and not from their real experience (or lack) of an event. Although the studies included in this thesis do not address the content or quality of what the children draw, it is important to reduce the cognitive demand on children and also to try to isolate the effect of drawing during the interview from the actual process of drawing. With this in mind an older age group of children was included in this study who should be better able to cope with the cognitive demands of being required to draw, remember and recall during the interview.

6.3 Method

6.3.1 Participants

Originally thirty-two participants were planned to be recruited from two different schools to take part in this experiment. However as flaws in the design came to light and only fourteen children aged seven to eight years (mean = 91. Months; S.D = 3) took part, the study is included here merely as a pilot The data from one other child was excluded, as the interview was indecipherable on the audiotape. Children were then randomly assigned to one of two interview groups; draw and verbalise and verbalise only (draw and verbalise = 7, verbalise = 6).

6.3.2 Questionnaires

Approximately three weeks before testing began, questionnaires accompanied by parental consent and information letters were sent out to a class of thirty children's parents. The letter provided the parents with an overview of the intention of the study and asked for their consent to test their child's memory. The questionnaires required the parents to identify and describe, in as much detail as possible, two significant events that had occurred during their child's life, one that took place in the last three months, and one that took place in the last year. The questionnaires also asked the parents to identify two events that had never occurred during their child's life. Parents were given a list of eight significant

events and were asked to indicate with a tick if they had ever occurred to their child (see appendix 4 for letter and questionnaire).

After three weeks sixteen questionnaires were returned. Two of these failed to meet the criteria and identified only one event that a child had not experienced. These children had to be dropped from the study at this stage, they were not included in the fourteen studied.

6.3.3 Procedure

After the fourteen questionnaires had been returned to the school, the experimenter chose two events that had never occurred during a child's life from the parents' tick box indication. These two events plus the two events that the child had experienced provided the content for each child's individual interview. Each of the children were therefore questioned about different events, but the 'reality' of their experience of these events was similar.

The fourteen children were split into two groups and were randomly assigned an interview condition, either verbalise only or draw and verbalise. Children were interviewed individually in a room with the experimenter. The experimenter spent time prior to the interview introducing herself to the children and building up a rapport with the child by engaging them in conversation about their current classroom activities. When the child appeared to be comfortable the interview began. All responses were recorded by audiotape and transcribed by the experimenter. The children were

told that they would be asked some questions and that they should try to tell the experimenter everything that they could about the event. The children were also told that it was O.K to say that they didn't know the answer to a question if they could not remember. The children were asked about the four events, identified by their parent's questionnaires, two of which had occurred during the child's life and two that had never occurred. The ordering of the true and false event questions was carefully counterbalanced. Children in the draw and verbalise group were asked to draw everything they could remember and to tell the experimenter about their drawing. Children in the verbalise only group were asked simply to tell the experimenter about everything that they could remember about the events in question. Therefore the children recalled freely with no prompting from the experimenter except to encourage more free recall ("anything else?"; "really?"). When the child's spontaneous recall ceased and they indicated that they did not remember any more information the interview was brought to a close. The child was given a sticker and thanked by the experimenter who told them that they had helped her to understand about what children can remember, the children then returned to their classrooms.

6.3.4 Coding

The information provided by adult's narrative description was broken down into units of recall. A unit represented any new information recalled, for example an object, place, or person.

Information provided by the children was compared to the adult's description. If any units were included in both the adults' and children's protocols then this was coded as 'correct recall' for the children and any extra information that the children provided was coded as 'extra' information.

Any units of recall provided by the children in response to questions about the false events were coded as ' false acceptance'.

6.4 Results

Participants were asked to draw and verbalise or just to verbalise everything that they could remember about four incidents. Two of these incidents had been identified by the children's parents in a questionnaire which asked them to detail two events that happened during their child's life. The other two incidents, the 'false' events, were identified by the questionnaire, which asked parents to identify two events from a suggested list that had never occurred in their child's life.

6.4.1 True Events

All of the children regardless of their interview condition agreed that the real events had taken place and provided spontaneous recall about the event. It is interesting to note that the content of children's and parent's reports was different. Parents descriptions included a mean average of 13.4 units of information and children's 'correct recall' had a mean of 2.5 units of information,

although the extra information they provided was much higher at a mean of 17.4 units of information.

The main interest is whether there was a difference between the interview groups (a) draw and verbalise, and (b) verbalise only, and the amount of recall they provided, and also in whether the ordering of the true and false event questions affected the children's recall. The total amount of recall was calculated by adding together the 'correct recall' and the 'extra' recall. A 2 x 2 ANOVA was revealed no significant effects for either interview condition, ($F(1,9) = 0.25$, $p = 0.63$), or for the ordering of the questions ($F(1,9) = 0.44$, $p = 0.52$), and there was no significant interaction, ($F(1,9) = 0.4$, $p = 0.85$). It should be noted that this statistical analysis should be taken very tentatively indeed due to the small amount of participants included in the study. Whether the children were asked a 'true' or a 'false' event question first did not affect the quantity of their recall. Also whether children were required to draw and verbalise or to only verbalise during the interview did not make a difference to the quantity of the children's recall. Analysis was also conducted on the separate types of recall provided by the children; 'accurate recall' and 'extra recall', ($F(1,12) = 0.07$; $p = 0.79$). There were no significant effects or interactions.

6.4.2 False events

Our main interest was in the responses to questions about events that had never occurred in a child's life, and specifically in

whether drawing during the interview increased the likelihood of the children providing incorrect recall to events that had never occurred. The children rarely provided recall in response to the irrelevant questions and in fact there were only 7 recall protocols out of a possible 26 that elicited responses to a question about a false event. Only 2 of the 7 recall protocols were elicited by children in the draw and verbalise group, although this difference was not significant, ($F(1,9) = 0.38$, $p = 0.55$). The ordering of the questions did not have an effect on the amount of recall elicited by the children, ($F(1,9) = 1.49$, $p = 0.25$), children were as likely to provide recall to false questions independent of whether they were questioned about true or false events first. Again in respect of the small sample size, these statistical analyses should be interpreted cautiously and only as an indication to expected findings in the future.

In summary, children provided a great deal of information when asked to recall events that had taken place in their lives, and it was rare for children to provide information in response to questioning about an event that had not occurred in their life. This pattern was not influenced by allowing children to draw during an interview, or by whether the children were asked true or false questions initially.

6.5 Discussion

This study was included to make initial investigations into whether drawing during an interview leads to increased errors when children are asked questions about an event that has never

occurred. Children were questioned about four events and were only asked one free recall question about each. Parents identified two 'significant' events that had occurred during their child's life and two 'significant' events that had never occurred during their child's life.

Very few children provided information about events that had not taken place in their lives regardless of their interview condition. There was little evidence to support the claim that drawing during an interview increased errors when the questioning is about something that did not happen, as if often the case in legal settings. Many previous experiments have found increased performance with drawing in directed recall (Butler et al, 1995; Gross & Hayne, 1998). On the surface, the findings from this pilot study indicate that the inclusion of drawing during an interview will not lead children to make more inaccurate responses even when questioning is concerned with an event that never occurred. But we should proceed with caution. Bruck et al (2000) and Gross (2001) have both reported increases in inaccurate recall associated with drawing, although both of these studies involved the inclusion of drawing prior to the interview as a rehearsal tool rather than an aid to recall during the interview. There are also a number of potential confounding factors and methodological issues which make it difficult to make any firm conclusions at this stage.

Primarily the number of participants render this study a pilot, and therefore the results can only ever be an indication of

expected findings and provide a direction for designing further studies.

The children in the present study were older than the previous experiment. This has advantages regarding the cognitive demands placed on the child when they are both remembering and drawing. It is well documented that suggestibility reduces with age (Ceci & Bruck, 1993). In this study children were accurate in denying that the 'false' suggested events had happened. This may be a reflection of the children's age in this study, and a reflection of a general reduction in suggestibility and not an indication of the effectiveness of drawing as a recall aid.

The particular school that took part in this study may also account for the results. The range of abilities of children in schools in Bristol is always a factor for consideration when designing experiments. The school that took part in this study is a particularly high achieving school scoring above average results in the National Key Stage 2 tests in English Mathematics and Science (DFEE, 2000). Children are actively encouraged by their teachers to question what they are told, they are mainly confident and most likely to be performing at a more advanced cognitive level than their ages suggest. Further study addressing these two possible confounding variables should allow firmer conclusions regarding this issue.

Fivush claimed that "Events that are extremely personally important are probably less prone to suggestion than are less important events, and the real events of a child's life are probably

more significant than story events and events constructed in the laboratory" (1993; p. 20). Although a developmental trend exists (Goodman et al, 1994), children are usually more accurate when they are asked questions about events that they have experienced than events that they have only heard about, (Fivush, 1993). Merritt et al (1994) found that children aged three to seven years were resistant to suggestion about events that had not happened to them. This may account for children's high accuracy in response to questioning about personally relevant events that did not occur. A further factor that should be taken into account in the future is that the 'false' events that the children were questioned about were major life events. On reflection such implausible events should not have been included in the content of the interview. On one hand it is important to note that it is rare that children can be induced to recall information about these events. But for future experiments less dramatic events should be included in the content of irrelevant questioning.

The present study made use of parental questionnaires. The advantages of this method were that parents could identify a 'significant' experience, and that the accuracy of the child's recall could be monitored against the adult's narrative description. Although there were few differences in the overall quantity of the children's recall and the parent's descriptions, there were substantial differences in what children and adults chose to recall. This is an

interesting finding, but we cannot be absolutely sure that the children's extra recall was accurate.

The results from this study do provide some interesting directions and indications. This is the main reason for its inclusion in this thesis; to provide a platform for the following experiment and those in the future. However it is included as a pilot and contains too many methodological issues to warrant its continuation as originally planned. The decision to terminate this experiment at this stage demonstrates reflective and cost effective research.

The effectiveness of including drawing during an interview with children is wholly dependent on further researching this question. In theoretical terms it may influence the literature on children's representational minds and their cognitive ability. In application terms it may be possible to recommend or deter the use of drawing in real clinical or forensic interviews. Further research with improved methodology will also help make real the possibility of making interviews with children more focussed to their needs.

Experiment 2

Pilot study 1 focussed on identifying the potential problems that may be associated with allowing children to draw during an eyewitness interview. Comparisons were made between children who drew and verbalised during an interview and those who verbalised only and their responses to questions about events that never occurred. There were no differences, children were extremely accurate in correctly rejecting suggestions that false events had

occurred. A substantial amount of methodological factors may account for these results, Exp. 2 takes direction from the pilot study and aims to re-address this question with improved methodology.

7.1 Introduction

This experiment is concerned with the potential problems that are associated with the use of drawing as a recall aid during an interview where the questioning is irrelevant. Our initial expectations were that the fantastical element, often associated with drawing, would encourage children who draw and verbalise during an interview to fabricate their responses more than the responses of children who only verbalised recall during an interview. Bruck and her colleagues (2000) investigated the effectiveness of drawing as a rehearsal device. They had children either draw or verbalise true and false reminders before an interview. Their results revealed that children who drew the reminders prior to the interview were more likely to include more of both types of reminder in their recall. Gross and Hayne (2001) also found that children incorporated completely false information, presented in drawings prior to an interview, into their subsequent recall of a related event more often than when the prior information was presented verbally. In pilot experiment 1 there were no significant differences between drawing and verbalising and verbalising only, and the likelihood of children recalling information about an event which never occurred. We identified some methodological issues that may have confounded the results in pilot experiment 1. By altering the ages of the children and

certain methodological aspects, the present study re-addresses this issue.

The encoding abilities of children have been contested for many years, some believe that it is children's poor encoding that leads to increases in inaccurate recall, others believe that it is the retrieval process that is responsible for children's poor performance in memory tests. Personally experienced and relevant events are assumed to be well encoded; this was proposed as a potential reason for children's high resistance to questioning about personally relevant events that never occurred in pilot study 1. In the present experiment all of the children watch a short scripted event staged by confederates on a video. All children have the same amount of time to encode the event and the same experience of the event. This aids the experimental control of the present experiment.

In pilot study 1 children had been asked about four different events. In this experiment children are now questioned with true and irrelevant questions about one event that is staged by confederates and is carefully scripted and lasts about six minutes. Irrelevant questioning about aspects of a scripted event is more analogous to real life questioning and may lead to children being more tempted to indulge in fantastical and inaccurate recall when they draw during an interview. Children watched a staged event and were later asked a series of questions, half of which had been included in the event and half that had been alluded to but not explicitly stated. We expected that children who drew during the interview

would provide more information about the false events than the children who verbalised only during the interview.

The ages of the children were reduced in this experiment from six to seven years back to five to six years. This is in line with the ages of children in other studies investigating the effect of drawing on children's recall (Butler et al, 1995), and also as a consequence of the older children's high accuracy in pilot experiment 1. The school recruited for this experiment had more average Key Stage 2 results for English, Mathematics and Science and was a more common national representation of the abilities of children at this age (DFEE, 2000). The number of children was also increased to provide a truer representation of children's abilities.

As it has been previously mentioned children can be reluctant to answer with "don't know" responses to questions when this is the case (Robinson & Briggs, 1997). By their nature the irrelevant questions require a 'don't know' response and this is the correct response. Informing children that it is O.K to respond 'don't know' to a question can increase the accuracy of their reports (Nesbitt & Markham, 1999). In addition to informing children that it is O.K to say 'don't know' an age appropriate confidence scale was included in this study, which is primarily designed to reduce any social pressure that children may feel when responding with a 'don't know' response.

7.2 Method

7.2.1 Participants

Thirty two children from one primary school in Bristol agreed to take part in this study. Parental consent forms were made available to the school. The children were aged between five and six years, (M = 67.81 mths: S.D = 3.21), and all shared the same class environment.

7.2.2 Materials

The event that the participants were later questioned about was shown to them via pre-recorded videotape. Three adult confederates took on the roles of a little girl, a robber and a policewoman, and took part in a scripted event involving the kidnap and return of the little girls' teddy. Appendix 5 provides an outline of the story and of the camera focus. The video was edited and put onto VHS videotape and lasted approximately six minutes.

A confidence scale was included, this was designed to be an appropriate and effective way to decipher 'don't know' from 'incorrect' responses. The confidence scale included three different sized, but otherwise identical blocks, which indicated 'high', 'middle', or 'low' confidence. Six sets of picture groups from the BPVS were put onto A4 paper and laminated. Two picture sets were taken from three different starting points on the BPVS (for 5 year olds, 7 year olds and 14 year olds respectively).

Drawing materials were provided for the group who reported their answers during the interview by drawing and verbalising.

7.2.3 Procedure

The experimenter spent one morning in the classroom familiarizing herself with the children. The participants were randomly assigned to one of two different groups; either a draw and verbalise interview condition or to a verbalise only interview condition. Children were taken out of their classroom in small groups of four and gathered around a television with the experimenter.

The experimenter informed the children that they were going to watch a short video and that they must watch very carefully and in silence. The children watched the video for about six minutes, which detailed the kidnap and return of a child's teddy bear (see appendix 5).

The experimenter explained the confidence scale to the children as follows and they took part in a training session. The experimenter explained to the children that the three different sized toy blocks had a special meaning when they were used with her. The largest block meant: 'I'm very sure I remember', the middle block meant: 'I think I remember the answer but I'm not that sure', and the smallest block meant: 'I don't remember the answer'. The confidence scale was introduced as a practice task initially. The experimenter illustrated the meanings of the blocks through example, asking herself three questions and choosing the relevant blocks to indicate her confidence in her own answer. The questions

were "Do I know my name?" for high confidence, "Do I know all of your names?" for not quite sure, and "Do I know what one of the group's best friends name is?" for low confidence. The participants were then asked one question which they either knew or didn't know and asked to choose the relevant block to indicate how well they knew the answer (e.g. they were asked if they knew their teachers name to elicit a high confidence response and they were asked if they knew what colour the experimenter's car was to elicit a low confidence response). The children were then given one of a set of six laminated picture sets from the British Picture Vocabulary Scale (BPVS), and were asked to indicate their level of confidence, with the blocks, in their choice of the picture that portrayed the word that the experimenter gave to them. The sets of pictures were of varying difficulty (taken from the starting point on the BPVS for five-year-olds, for seven-year-olds and for fourteen-year-olds), and were presented to the children in random order. The training session was complete when all of the children understood the confidence scale, and it lasted approximately 15 minutes.

After a short delay of about thirty minutes the children were called out individually to take part in an interview with the experimenter. The experimenter sat with the child and engaged in conversation about the child's current activities in the classroom in order to build up rapport and to create a comfortable atmosphere for the child. The child was then told that they would shortly be asked some questions and that it was important for them to answer

either by both drawing and verbalising, or by verbalising the answer depending on their interview groups. It was emphasized to the children that they should only report to the experimenter things that they remembered from the video. She asked them if they remembered the meanings of the confidence indicators, the children reported each meaning and pointed to the relevant sized block. In cases where the children did not remember the meanings time was spent re-explaining the confidence scale to them. Importantly the children were told that if they didn't know the answer that it was O.K. to report that they did not know, and that they would just carry on to the next question. Eight questions were included, four of these were questions about scenes that had been displayed during the video, and four were about scenes that were implied but were not shown in the video (see appendix 6). The ordering of the two types of questions was carefully counterbalanced, to ensure that their was an equal number of children in each group that received 'irrelevant' questions and 'true' questions first. The correct answer to the irrelevant questions was therefore 'don't know'. The linguistic and social pressures associated with making this response were reduced by the inclusion of the confidence scale, allowing children to physically indicate that they did not know the answer to a question. The interviews were audio taped and transcribed, only children's verbal recall was scored. The children were then given a sticker and thanked, and told that they

had helped the experimenter to understand more about children's memory and the children returned to their classroom.

7.3 Results

Participants were split into either a draw and verbalise or to a verbalise only interview condition. Four questions were asked about scenes that had been shown in the video (true), and four questions were asked about things alluded to during the video, but not shown (irrelevant). The ordering of these questions was counterbalanced.

7.3.1 True Questions

The responses to the four questions, to which the correct answers were included in the video were combined. An analysis of variance was conducted on the total number of correct responses to the four accurate questions, with interview conditions and question order as the between-subject factors. There was no main effect of interview condition, ($F(1, 28) = 1.53$, $p = 0.24$), participants in the draw and verbalise interview group and those in the verbalise only group had similar high accuracy (mean = 3.0 and mean = 3.44, respectively), and were in fact approaching ceiling levels. There was no main effect of question ordering ($F(1, 28) = 3.78$, $p = 0.07$), children were not more likely to answer questions incorrectly if they were asked a true or an irrelevant question initially during the interview, (mean = 2.88, and mean 3.56, respectively). There was no significant interaction between the interview condition and the ordering of the questions ($F(1) = 0.64$, $p = 0.43$) (see figure 1).

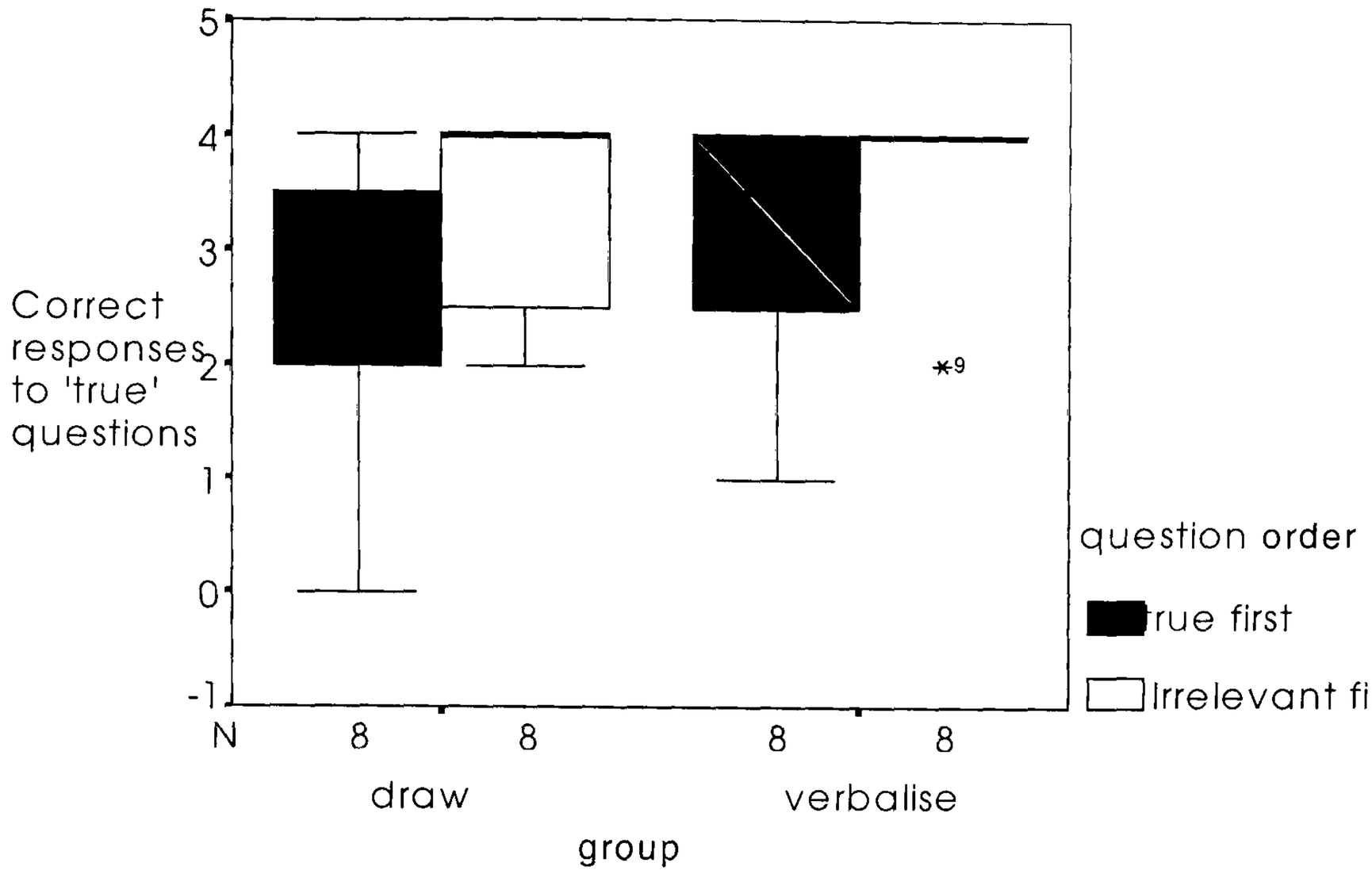

Figure 1 Responses by the draw and verbalise and verbalise only group to true questions.

7.3.2 Irrelevant Questions

The responses to the four irrelevant questions were totaled. It is important to note that in this case the correct response to a question is 'don't know'. An analysis of variance (ANOVA) with interview conditions and question order as between-subject factors was carried out. The verbalise only group were more accurate in responding with the correct answer 'don't know' (draw and verbalise; mean = 1.94, and verbalise; mean = 2.5; see figure 2) to the irrelevant questions, although this effect was not significant ($F(1) = 1.06$, $p = 0.31$). There was also no main effect of question ordering ($F(1) = 0.33$, $p = 0.57$), again accuracy was similar for both groups (draw and verbalise; mean = 2.06, and verbalise; mean = 2.38).

There was no significant interaction between the interview condition

and the ordering of the questions, ($F(1) = 0.64$, $p = 0.43$). These results indicate that drawing does not increase inaccuracies in children's recall in response to irrelevant questioning.

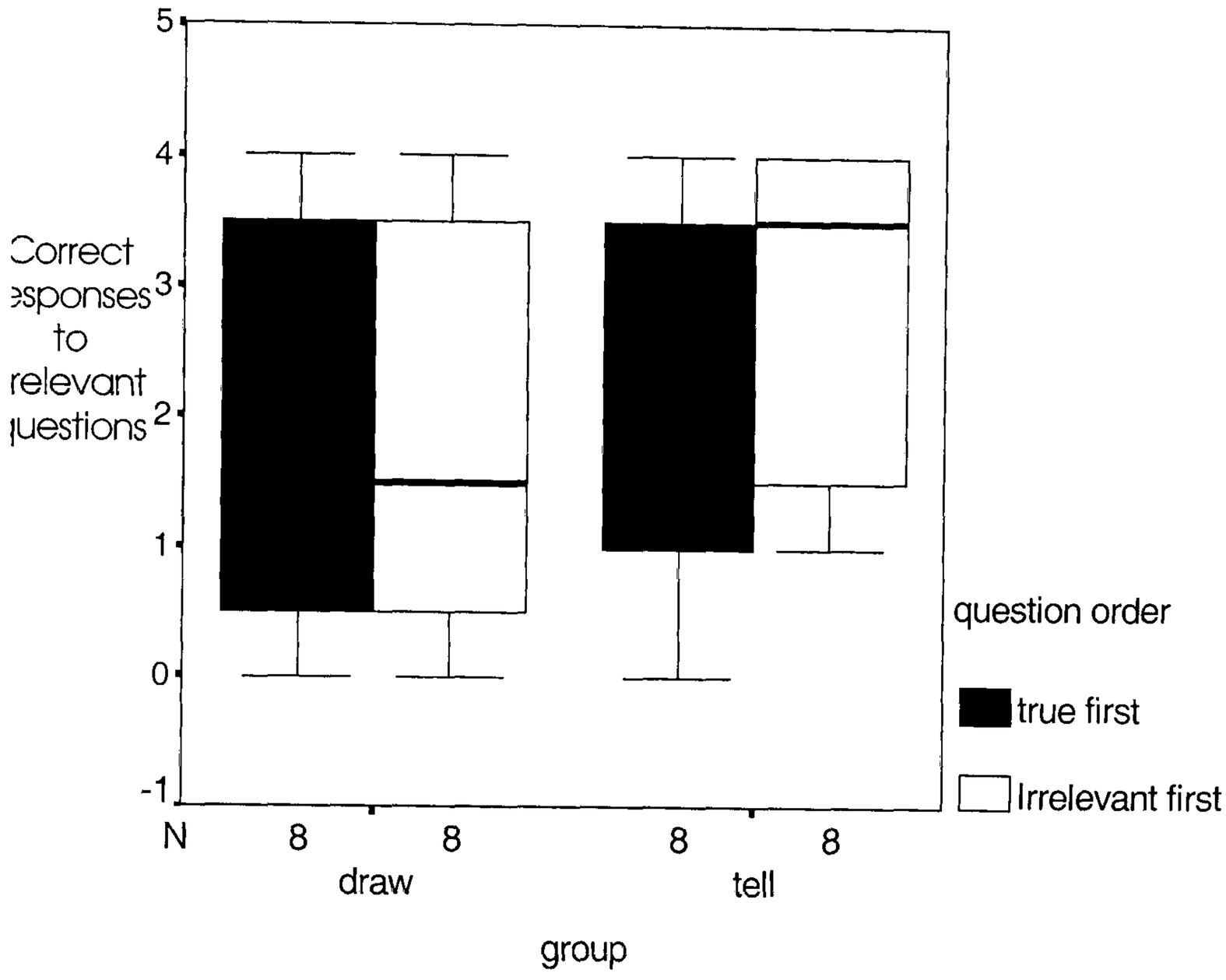

Figure 2 Correct responses by the two interview groups in response to irrelevant questions.

The confidence scale was included in this study to encourage children to respond accurately with 'don't know' responses and account for this as a potential reason for children's inaccuracy to irrelevant questioning. Correct 'don't know' responses were highly correlated with children's use of the low confidence indicator ($r = 0.89$, $p < 0.01$). This further supports the inclusion of the confidence indicator as a tool for children to report that they do not know the

answer to a question. The confidence scale results are presented and discussed in separation and in more detail in chapter 5.

7.4 Discussion

Allowing children to draw during an interview is a widely used method in the clinical field, although there is little experimental evidence which advocates its use (Burgess & Hartman, 1993). Recently the use of drawing during interviews has also been suggested in the eyewitness testimony literature, and this has led to surge of research on this subject. However there are currently mixed findings about its effectiveness as a recall aid. So far all of the experimental work has focussed on comparing drawing and verbalising with verbalising only, answers to questioning about events that have actually taken place. Many experimenters have concluded that there are beneficial effects to be gained. This may be premature, not only because the findings are currently mixed, but also because there is a gap in the literature of research concerning whether children's testimony will still have improved accuracy when children draw and respond to questioning about an event which never happened. This has enormous importance in the applied field as children are often questioned in both clinical and legal settings about events that did not take place.

Although the verbalise group were slightly more accurate in correctly rejecting the irrelevant questions, there were no significant differences between the interview conditions draw and verbalise and verbalise only. This in itself is a positive finding and suggests that

there may not only be benefits to recall when questioning regards real events, but that drawing does not increase inaccuracies in recall even when the questioning is irrelevant.

The findings in this study have applications to the interview process with children. Including drawing in investigative interviews with children could increase the detail of children's (Butler et al, 1995; Gross & Hayne, 1998), and the data from this experiment suggest that this facilitation may not necessarily be accompanied by a decrease in accuracy of children's reports. However we must proceed with caution.

In a recent study Bruck et al (2000) addressed a similar question. Their study involved a comparison between children who rehearsed true and false reminders about an event by either drawing or by verbalising them. Children who drew the items prior to the interview included more true and false reminders in their subsequent recall. Bruck and colleagues (2000) concluded that drawing has negative consequences regarding false information (see also Gross, 2001). Further research is required to make direct comparisons between the effects of including drawing as a rehearsal device and including drawing as a recall aid before any final conclusions about the usefulness of drawing during interviews with children can be made.

The confidence scale data in this study also indicate that children can overcome their reluctance to admit that they do not know the answer to a question when they have a physical indicator

for a 'don't know' response. The effectiveness of the confidence scale was an unexpected and most encouraging result. Further research should be devoted to investigating its use further and possibly standardizing it as a test (see chapter 5 for a detailed discussion).

In conclusion, I expected that when children are required to draw and verbalise in response to questioning about an event which never occurred they will provide more inaccurate responses than when they are required to verbalise only. The direction of the results in this study did conform to my expectations, although I did not find a significant effect. Drawing and verbalising may therefore be as accurate as verbalising only in interviews with children in an eyewitness context. At this stage I are reluctant to conclude that this is the case as further study is required.

Chapter 3

The effect of omission and a cover up.

Experiment 3

6.1 Introduction

Initially, at the stating point of this research the main focus centred on investigating the effects on children's testimony of allowing the children to draw during the interview. This was an issue that was receiving a great deal of attention three years ago, and one that continues to attract research interest.

There are mixed findings in the literature, as has been discussed earlier, regarding the effects of drawing during the interview. This experiment included a comparison of the verbal recall elicited from children who drew during the interview and from children who did not draw during the interview. Drawing was thus included for exploratory purposes. To ensure contact with the literature and to assess the implications of including drawing as an aid to recall, the method followed the format of other studies that have also addressed this issue (Butler, Gross, & Hayne, 1995; Gross & Hayne, 1998). A group of children were provided with drawing materials during the interview and asked to draw everything that they could remember and to tell the experimenter about the drawing. Their verbal recall was compared to a group of children who were given the same recall prompts, but did not have an

instruction to draw during the interview. I expected that drawing would improve the detail and accuracy of children's reports.

At this stage of the research process, investigating the possibility of making children's memories less accessible was an ambitious step and presented considerable empirical risk. Making the memory of a scene from an event less accessible in children had only once been previously investigated, by Pezdek and Roe (1997), who were unsuccessful in producing a significant result. I argue that this was mainly due to the methods used in their study.

Pezdek and Roe (1997) attempted to 'erase' the memory of a scene from an event by suggesting that this scene did not take place. To recap briefly on this study, the authors explored the relative ease of implanting, changing and "erasing" the memory of an event involving a touch in two groups of children, aged four and ten years. Children viewed a series of slides and were either touched or not touched during the presentation of a particular slide. The PEI consisted of a review in which (a) it was suggested that the children were touched when they were not (an implant condition), (b) a different touch to the original was suggested (a change condition) or (c) it was suggested that there was no touch (an erase condition). Children's recall to questions about these target scenes was compared to controls. It was noticeable that all of the effects were in the predicted directions; accurate memory of the original scene was slightly lowered when attempting to add, to change or to erase memories. The change condition was the only

one to reach statistical significance and the authors concluded that it was easier to change a memory than to implant or to erase a memory.

But it was my belief that the mere suggestion that a scene did not occur during PEI may have activated the memory for this scene because the scene had been referred to and therefore received activation. If this is the case then children who did not recall the target scene may have not done so due to acquiesce with the adult (authority) figure who had told them that this scene did not occur. We can't be sure then, that any reduction in the recall of the target scene represents either true forgetting or the 'erasure' of a memory.

The aim of this experiment was to investigate whether the memory of a target scene from an event could be less likely to be recalled by improving the methodology of Pezdek and Roe's study (1997). Children were exposed to PEI in which a target scene was simply omitted and covered up with smooth editing, from the review of the original event. I believe that this provides a more direct and accurate assessment concerning the possibility of inhibiting a memory, as there has been no explicit cue for the memory of this scene (negative or positive). This method also provides more real-life applicable results, especially in terms of child abuse situations where the adult may fail to discuss an abusive event with a child but openly discusses instances prior to and after the abusive event. The demonstration of a strong effect of PEI

omission in this experiment, and those that have since replicated this finding (see experiment 4) of making children's memory of a scene less accessible proved to be the most exciting and unexpected result of this experiment.

Children took part in an interactive cooking task composed of eight scenes. The event being interactive, it both increased the ecological validity of this study and allowed for the data to be more readily applied to real eyewitness situations. Two target scenes were included as those that would be omitted from PEI. Both were script relevant, the first (recipe book scene) was included as a peripheral non-touch event. In line with Pezdek and Roe's (1997) study, the second target scene (hand washing) was chosen as a personally relevant, 'touching' event. A touching scene was also chosen to enable comparisons between this study and child abuse situations.

A further important factor was ensuring that children had the confidence to admit that they did not know the answer to a question. Previous research has been confounded by the fact that children are likely to guess inaccurately, rather than admit that they do not know the answer to a question (Robinson & Briggs, 1997). Simply by telling the children that it is O.K to say that they don't know the answer, increases the accuracy of their testimony (Nesbitt & Markham, 1999; Memon, Holley, Wark, Bull, & Kohnken, 1996).

To reduce the potential influence of the linguistic demands and social pressure that children who are having difficulty in admitting that they do not know the answer to a question may feel,

I devised a confidence scale. An extensive literature search failed to reveal the presence of any device that successfully elicited children's confidence. The scale was included primarily to allow the children to indicate physically that they did not know the answer to a question without voicing this position.

8.2 Method

8.2.1 Participants

Three Bristol primary schools were contacted by post and approached for their consent to allow pupils to participate. Parental consent forms were made available to the schools. Seventy-eight children aged five to six years (M= 72.5mths: SD = 3.7) agreed to participate in this study.

8.2.2 Design

The present experiment used a 3 (PEI group: omit, repeat, control) x 2 (interview condition: draw and verbalise, verbalise) mixed design. The PEI group was a within subject factor. The control group consisted of twenty-six children who provided responses to both of the target questions (Q3 and Q7) producing a total of fifty-two responses. The other fifty-two children formed the omit and the repeat groups. Half (twenty-six) of the children had one of the target scenes (scene 3) omitted from a PEI review and had the other target scene (scene 7) repeated, and the remaining twenty-six had the opposite (scene 7 omitted and scene 3 repeated in the PEI review). This resulted in the children in the experimental groups

being included in both the repeat and omit groups, in relation to the two different target scenes producing fifty-two responses in total in both the repeat and the omit conditions. The interview conditions were the between subject variables, and participants were randomly assigned to either a draw and verbalise or to a verbalise only condition.

8.2.3 Procedure

The experimenter spent one morning in each of the three schools, familiarising herself with the children and the school environment. The original event was interactive and involved children taking part in a cooking activity in small groups (between six and eight). The children entered a room in which the disguised experimenter introduced herself as a cook called "Mrs. Flour". Efforts were taken to disguise the experimenter as Mrs Flour (she wore a large hat, glasses, a flowery dress and an apron) and the experimenter took on the persona of the cook, encouraging children not to associate her with the experimenter that they had seen earlier, and would subsequently see as the interviewer. This enabled the use of pronouns during the children's verbal recall to be coded, so that I could ensure that the children were recalling their own experience of the cooking event. She asked the children their names and if they would like to have a tea party. Mrs Flour and the children then discussed what the rules of the activity would be, placing particular emphasis on listening and looking at everything that happened during the cooking time, to ensure that their cakes

would taste nice. The participants were asked to find a space around the table where a plastic cup and paper cake case had been placed. All children took part in a scripted cooking event in which they eventually produced a small chocolate cake. The event consisted of a series of eight steps that are detailed in Table 1; each child completed these regardless of their final test conditions. (The specific materials used during the cake making are also detailed in Table 1). After the cake - making had taken place, the children sat together and had a tea party, before returning to their classrooms. The incident lasted approximately thirty minutes. The design is thus rather labour intensive, but I deemed it better to invest in working intensely with each child rather than more clumsily with a large number. It is important to be sure that each individual has the requisite experience of the original event to enable them to give clear data.

Scene	Mrs. Flour's speech	Actions
1	Hello children. Come in and sit down. Today I thought it would be fun for us to make chocolate crispy cakes together. Would you like to do that? Ok, then we can have a tea party together. The most important thing now is that you must listen very carefully to everything I say so that our cakes will taste nice.	Mrs. Flour is sitting in the room, the children come in and stand in a circle around her.
2	The first thing we have to do is to put an apron on so that our clothes don't get dirty.	Child puts on an apron and Mrs. Flour ties it up.
	I'll just put my recipe book on to this	Mrs. Flour moves the

3	chair.	recipe book onto the chair.
4	I'd like you to pour some rice crispies into your cup. I have the big bowl here and I'd like you stand in a line and come and pour your cup of cereal into this bowl.	Children bring their cups, Mrs. Flour fills them with rice crispies. Children pour contents into main bowl.
5	I'm going to pour this melted chocolate into the bowl because it is hot. I'd like each of you to come up and give the mixture one big stir.	Mrs. Flour pours the chocolate into the bowl. The children stir the mixture once.
6	We will put the cakes onto this tray by our names and leave them to cool down while we set the table.	Mrs. Flour points to a tray, with the children's names on, and the children put the cakes onto the tray.
7	Now we must wash our hands before we eat the cakes, so if you come over here I will wash them for you.	Mrs. Flour washes and dries the children's hands.
8	Now we can have our tea party.	Children sit around the table and have their tea-party with their cakes and drinks.

Table 1. The eight scenes which comprise the cooking event.

PEI was shown to the children on the following day. The PEI conditions included a control group and two experimental groups; an omit and a repeat group. To re-cap briefly there were a total of fifty-two children in the omit group, half of these had one of the target scenes (scene 3) omitted and half had the other target scene (scene 7) omitted from the PEI review. If the children had target scene three omitted from the PEI review, then the same

children had the other target scene, seven repeated, and vice versa, and this produced the repeat group. So the design permits both between - subject and within - subject comparisons, as will be made clear in the Results section. The participants were also randomly assigned to either one of two interview conditions (draw and verbalise or verbalise), thus there were thirteen participants in each condition.

PEI was presented in a different room to the original event and involved the children watching a short video. The children were reminded of the rules by the experimenter, which were to be very quiet, and to listen to and to watch the video very carefully; (they were not told anything about the content of the video). Depending on their testing group, the children watched one of three videos, two of these included the same sequence of scenes that comprised the original event, with one of the "target" scenes having being omitted using the Adobe Premiere 4.2 computer program. A young adult confederate took the part of the child during PEI. Maintaining the experimental control of the cooking script across the conditions that was required for the PEI video required an adult to fulfil this role. A child would have been preferred to more accurately reflect the original event but it proved impractical to train a child up for this role. Careful editing of the scenes ensured that those scenes immediately before and after the target scene blended together and continued smoothly so that the target scene was effectively covered up. The target scene was when Mrs. Flour moved her

recipe book onto the chair (scene 3 in Table 1), and when Mrs. Flour washed each of the children's hands before they ate their cakes (scene 7 in Table 1). These scenes were both relevant to the script of cooking, and were chosen due to the difference in touching. The control group also watched a short video, for the same amount of time (approximately seven minutes). This shared no similarity with the original event, and consisted of a short song about the alphabet ("Fun with abc", 1997).

After the PEI videos had been shown, the experimenter explained the confidence scale to the children. (For a detailed description please refer to exp. 2 in chapter 1) To reinstate the prime purpose of the confidence scale was to allow the children to admit that they did not know the answer to a question. One possible use for the data produced by the scale was in case all of the children recalled the touching scene even in the omit condition: maybe changes in recall would be picked up by a fall in confidence in the recall?

The children returned to their classroom, and after a short delay of about thirty minutes they were called out individually to take part in the interview session. The interview took part in a different room to the original cooking event and to the room where the PEI video was shown in order to eliminate any context effects during recall (Priestly, Roberts, & Pipe, 1999). Children were assigned either to a 'draw and verbalise' or to a 'verbalise' interview condition.

For free recall, children in the draw and verbalise condition were asked to draw everything that they could remember about making cakes yesterday and to tell the experimenter about everything in their drawing. Children in the verbalise condition were asked to tell the experimenter everything that they could remember. All interviews were audiotaped. During free recall the experimenter provided little input other than repeating the children's recollections, and asking "anything else?" Recall protocols were assessed to identify whether children made a link between Mrs. Flour and the interviewer, as this may have confounding effects on the data.

After spontaneous free recall, the children were told that they would be asked a series of questions and that they would use the confidence scale again. In cases where the children did not remember the meanings of the blocks, time was spent re-explaining it to them. The children were then asked eight direct questions (see table 2), including two questions that related to each of the target scenes (question 3 and question 7, in table 2). The remainder of the questions were "non-critical" questions and each related to one of the scenes in the original event. The questions were asked in the order that the corresponding scenes appeared in the original event and the PEI, which maintained a schematic representation of the overall event. Children assigned to the 'draw and verbalise' group continued to both draw and to verbalise their response, and children in the 'verbalise' group recalled the answer to the direct

questions by verbalising their answer. All verbal recall was recorded. When the questioning phase had finished, the experimenter thanked the children and gave them a sticker. Afterwards, children were debriefed by the experimenter, who told them that they had helped her to understand about what children remember and that they had been very helpful.

Can you draw and tell me /or tell me:		
No	Question	Answer
1	What Mrs. Flour was wearing when she made some cakes with you?	HAT
2	What you had to put on when you made the cakes with Mrs. Flour?	APRON
3	What Mrs. Flour did with her recipe book?	PUT ON CHAIR
4	What you used to pour the rice crispies into?	CUP
5	What Mrs. Flour poured into her big bowl with the rice crispies?	CHOCOLATE
6	What you put the cakes onto to let them cool down?	TRAY
7	What Mrs. Flour helped you to do after you had made the cakes?	WASHED HANDS
8	What you did with the cakes in the end?	ATE THEM

Table 2. The eight direct questions given to the children following the free recall stage. The critical questions were question 3 and question 7.

6.2.4 Scoring

For free recall, a detail (action, person, place, object) that was present during the original cooking event was scored as one correct memory point. For example: "then we stirred it up, then we put melted chocolate in and then put them in our cake cases" would be given four correct memory points for reference to stirring, melted, chocolate and cake cases. Incorrect recall, for example "we put them in the oven", was scored as an incorrect memory point.

Answers to the direct questions were coded as either correct, incorrect or don't know. The correct answers to the direct questions were identified prior to the experiment and are listed in Table 2. Incorrect answers to the direct questions were further investigated to identify whether they may be considered correct, had a correct answer not been previously identified. I present the frequency of commission and omission errors in the results section.

Five independent raters, all developmental psychologists with extensive experience, were instructed to consider the scenes in the event and to rate the questions and the pre-determined answers and to determine their salience for children's recall. There was 100% agreement between the raters and two clear groups emerged, questions 1, 5, and 8 were classified as highly salient, and questions 2, 4, and 6 were classified as less salient questions.

An anticipated issue was the questionable certainty that the children were reporting scenes from their own experience and not

reporting information extracted from the video. Children in the omit condition may have remembered the original scene but chosen not to recall it because they could not remember seeing it in the video, or they may have interpreted the request for recall to include information in the video only. From the literature it is unlikely that the children would do this, as their desire to recall the correct answer and please the interviewer would far outweigh the suppression of the answer. A more direct way to address this was to consider the language that the children used during their recall protocols. I assessed the children's use of personal pronouns that would denote their experience of the original event, as distinct from their use of third person pronouns, which would refer to the girl in the video.

A further issue that may effect the results of this study was that the children might have made the connection between "Mrs. Flour" and the experimenter that they had met earlier. Ideally to avoid any interference from this Mrs Flour and the interviewer could have been two different people. Within the confines of this research this proved to be impractical. To address this issue I coded children's recall protocols to identify whether they referred to 'Mrs. Flour' as a separate person, or they used 'you' to refer to Mrs Flour which would denote the interviewer and indicate that the children realised that they were the same person. In the future it might be interesting to ask explicitly about the connection between Mrs. Flour and the experimenter at the end of the study although there would be a problem of how to avoid children trying to please the experimenter

by providing the answer that they believe the adult desires. In that light, the pronoun data I used is probably safer as an indication that the children had not recognised the experimenter.

8.3 Results

Participants were required either to verbalize and draw, or to verbalize, everything that they could remember about the previous day's interaction with Mrs. Flour. Responses were analyzed to identify any facilitative effect of drawing as the literature suggests (Butler et al, 1995; Gross & Hayne, 1998). Responses to the two direct target questions were analyzed primarily to assess whether these memories are less accessible as a result of them not being shown during PEI, and also to determine whether there was an effect of interview technique.

8.3.1 Conforming to Task Demands

The first question was whether children really did recall their own experience of the original event. The danger is that they might recall information from the video itself in which the child was another person. Reassuringly, during all of the recall protocols there was not a single use of a third person pronoun. Each child used first person pronouns, and used them continuously throughout their recall, (except for 3 children who did not use pronouns at all, and it so happened that each of these 3 were in the 3 different PEI groups). Children's recall also included details that were unique to that particular child's experience, for example mentioning the other

children who were in the same group, the fact that they took turns to stir, etc. I conclude therefore that the children were indeed reporting information from the original event.

A second question for concern is that children may realize that the experimenter and Mrs. Flour were in fact the same person. The children's recall protocols were coded to indicate whether the children made the connection between the interviewer and Mrs. Flour being the same person. None of the children used the second person pronoun 'you' to refer to Mrs. Flour during the interaction with the interviewer. I strongly suggest that the children did not make the connection between the interviewer and Mrs. Flour.

8.3.2 Free Recall

The numbers of correct and incorrect details were calculated for each participant. A 2 (interview condition: draw and verbalize *Vs* verbalize) x 3 (PEI: control *Vs* 2 experimental groups) analysis of variance revealed a main effect of interview condition ($F(1, 72) = 4.36$, $p = 0.04$), suggesting that drawing has a facilitative effect on free recall (see Figure 3).

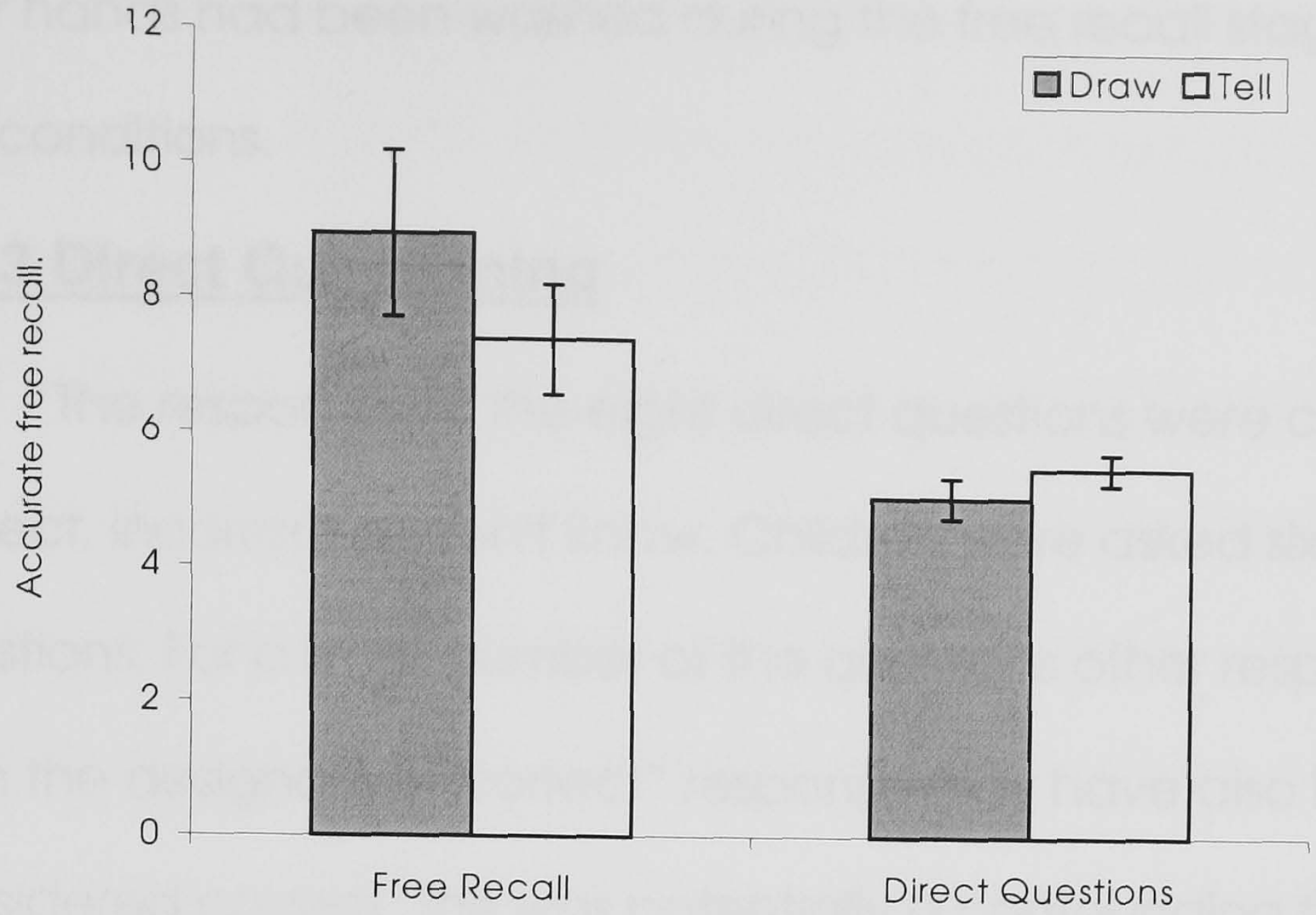

Figure 3. The means and 95% confidence level of correct responses elicited in the draw and verbalise and verbalise interview conditions in the free and direct questioning phases. The direct questions include only the non-critical questions for each group.

Accuracy in free recall by both the control and the experimental groups was very high. There were very few incorrect responses to the free recall question, (only four in the verbalise condition, and one in the draw and verbalise condition). As it happened, none of these inconsistent responses related to the target scenes. The high accuracy during free recall was as expected, from Gee and Pipe (1995), and Butler et al (1995), (see also Koriat & Goldsmith, 1996, on adults). Recall of the target scenes during free recall was minimal; not one child reported the recipe

book being moved onto the chair, and only twelve reported that their hands had been washed during the free recall stage across the conditions.

8.3.3 Direct Questioning

The responses to the eight direct questions were coded as correct, incorrect or don't know. Children were asked six non-critical questions. For a small number of the questions other responses apart from the designated "correct" response may have also been considered correct. This was potentially a confounding factor that may have influenced the results negatively, (for example question 1 "What was Mrs. Flour wearing" included more possibly correct answers than the target "hat"). In applied circumstances many questions potentially have more than one correct answer. The answers to the questions were structured carefully to avoid this confusion; the answer to the first question ("hat") for example referred to a very prominent part of Mrs. Flour's outfit. The hat was large, colourful and children found it amusing. Although many of the responses did include more information than "hat" the results were not affected adversely as the target answer was recalled on all of the occasions where another answer may have been considered correct. This was a similar finding across the responses to the non-critical questions.

Overall, accuracy was high (M = 5.05, (SD = 0.92) correct responses in the draw and verbalize group, and M = 5.49, (SD = 0.72) in the verbalize group). Responses to the non-critical questions were

then analyzed according to the experimental and control groups. Highly salient questions 8,5 and 1 produced few differences in responses between the experimental groups who had all of the non-critical scenes repeated during PEI and the control group who had nothing repeated. All children were extremely accurate in responding to the questions indicating that these scenes were particularly well remembered (see Figure 4). For less salient non-critical questions 2,4 and 6, the control group was less accurate than the two experimental groups (see Figure 4). The repetition of these scenes during PEI increased the likelihood that the children would recall them, compared to children who had only experienced these scenes during the original event. Although all of the effects were in the expected directions; with the experimental groups more accurate than the control group, the differences between the control and experimental groups were small (see Figure 4).

Figure 4. Correct responses to the non-critical direct questions, grouped by their salience. Questions 8,5 and 1 are considered highly salient questions and questions 2,4 and 6 are less salient questions. There are no differences between the two experimental groups, as both receive a PEI review in which all of the scenes relating to these questions are repeated. The control group do not have any scenes repeated during PEI.

We now consider the two target questions; Q3 and Q7. Responses from the group that had the target scenes repeated during PEI were compared to the control group's responses. We expected that the pattern of results would be analogous to that of the non-critical questions as both involve comparing a group who had a scene repeated against a control group who had nothing

repeated. The control group were less accurate in responding to the target questions than the experimental group who had the target scene repeated during PEI (χ^2 (1, N = 52) = 1.30, p = 0.26) for question three (recipe book scene) and (χ^2 (1, N = 52) = 0.79, p = 0.38) for question 7 (hand washing scene). This replicates the results of the less salient non-critical questions. These differences were not significant however, although the trend was similar to previous findings.

My main interest was in the two target questions (3 and 7, see Figure 5 a and 5b), and specifically in whether omitting a scene from the PEI review of the original event induces this scene to be recalled less. If a participant saw the PEI with the recipe book scene omitted their data were included as 'omit' for their response to the recipe book question, and included in the 'repeat' group for their answer to the handwashing question (and vice versa; if the handwashing scene was omitted then the recipe book scene was repeated during PEI). The control group's responses to both questions were used for both comparisons. Logistic regressions indicated that children were less likely to recall the target scenes correctly when they had it omitted during PEI (χ^2 (1, N = 104) = 12.25, $p < 0.01$), in comparison to the control group who had nothing repeated during PEI.

The above global analysis is most informative and indicates that children can be induced to not report a scene by omitting it from a PEI review. However to give assurance of a robust result,

question by question analyses was carried out on the two target direct questions. Responses to the target questions from children in the control group who had nothing repeated in PEI, were compared to the responses to the target questions from children who had only the target scene omitted from the review. Children were less likely to respond to the target question correctly when it was omitted from the PEI review for the non-touching, peripheral target scene (recipe book; question 3) compared to the control group, (χ^2 (1, N = 52) = 3.91, p = 0.048). The pattern was replicated for responses by the omit and control group to the 'touching' target scene (handwashing; question 7), (χ^2 (1, N = 52) = 9.67, p = 0.002) (see Figures 5a & 5b).

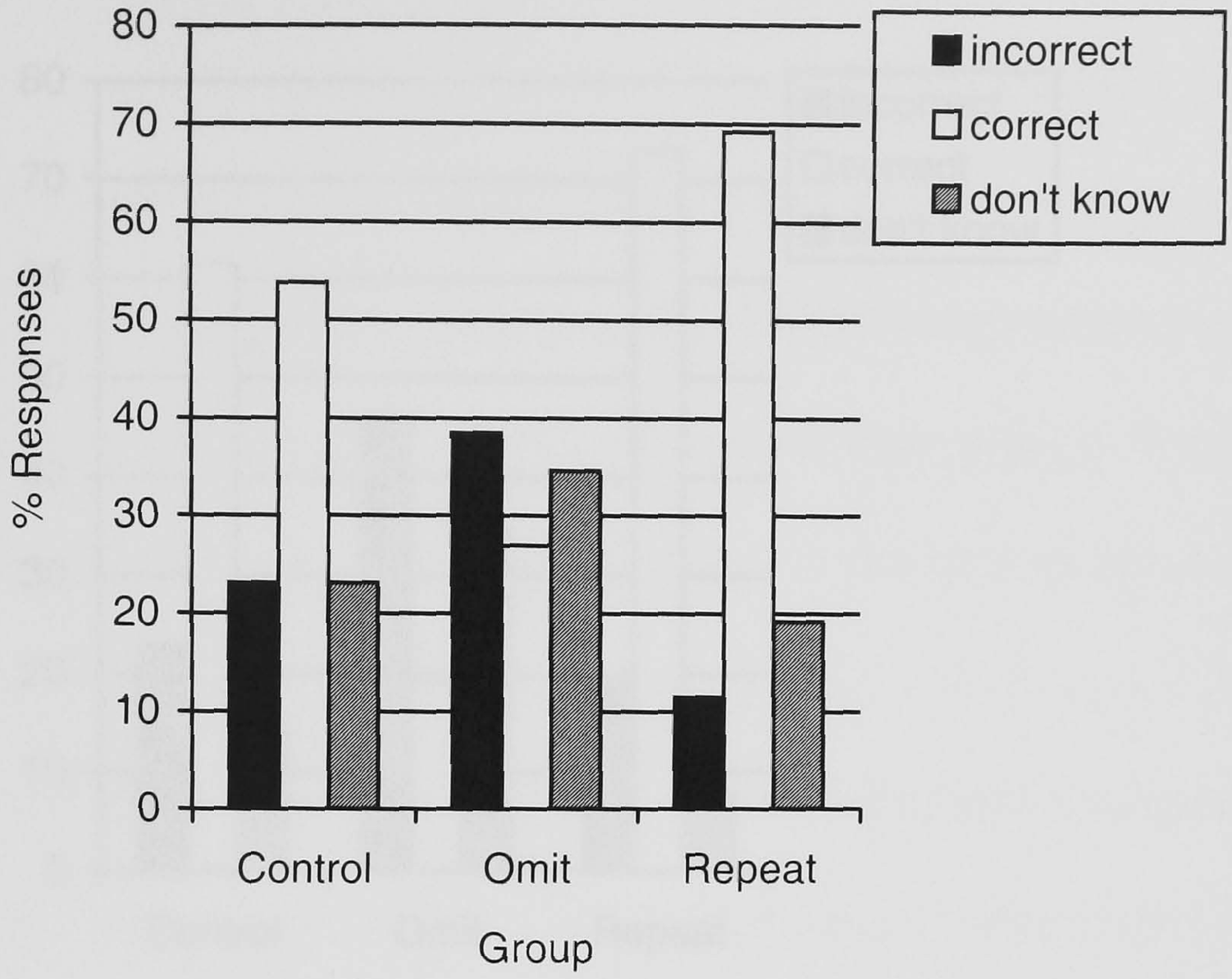

Figure 5a. Distribution of percentages of correct, incorrect and don't know responses to the target question relating to the recipe book question by the experimental groups (repeat and omit) and the control group.

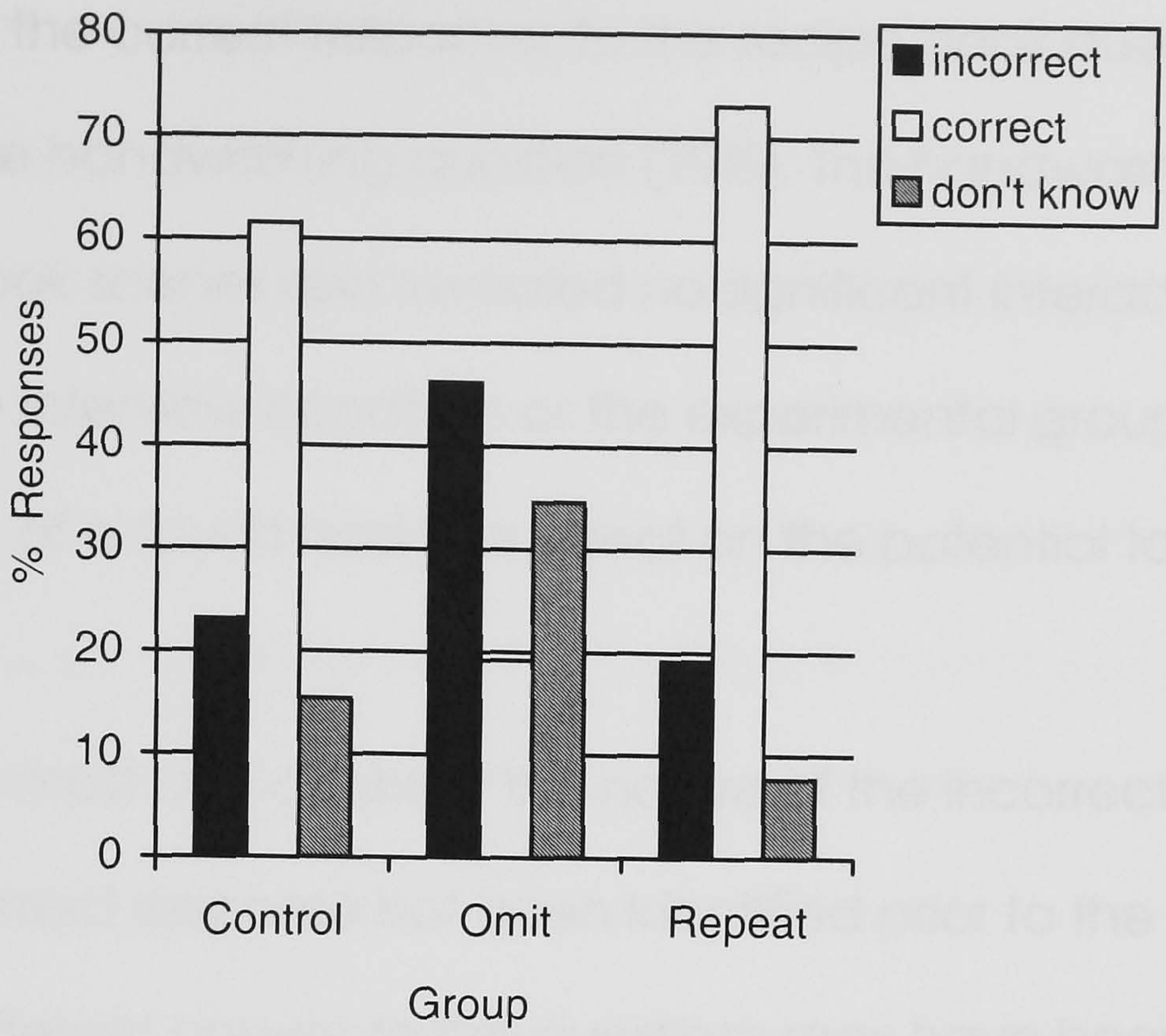

Figure 5b. Distribution of percentages of correct, incorrect and don't know responses to the target question relating to the handwashing question by the experimental groups (repeat and omit) and the control group.

These findings confirm that there has been some degree of inhibition. The control group who witnessed no shared information with the original scene in PEI were more accurate in response to the target questions than the children who witnessed all of the original scenes in PEI except from the target scene (Figures 5a and 5b).

There were no significant interactions between the PEI groups and the two interview conditions draw and verbalise and verbalise

only, indicating that drawing during the interview did not influence the potential to inhibit memory. There were little differences between the correct responses to the recipe book question (27%) and to the handwashing question (19%). The handwashing and recipe book scenes also revealed no significant interactions with either the interview condition or the experimental groups. Thus, the presence of a touch had little effect on the potential to inhibit a memory.

We must also consider the nature of the incorrect responses. Had a correct response not been identified prior to the interview then a different answer to the questions may have been considered correct. In total there were 72 incorrect responses. Of these only 9.7% could have been considered an alternative correct response, as they were included in the original event. The remaining incorrect responses were mostly errors of commission; for example in response to question 3, "Can you remember what Mrs. Flour did with her recipe book?" children responded, "she read it". This suggests that children are not replacing the original memory with something else that occurred during the original event, but that they are inputting information that is probably associated with their individual scripts of (in this case) cooking, to answer the questions.

8.3.4 Confidence and Accuracy

The confidence scale was included primarily to allow children to report that they did not know the answer to a question. When the children indicated that they had high confidence we expected

their responses to be mostly correct, when they indicated low confidence we expected them to have a 'don't know' response. The responses to all of the direct questions were combined to produce an overall score of 'correct' and 'don't know' responses, these were correlated with the overall number of high and low confidence indicators. As will be seen in chapter 5 where the confidence data are collated, there was a strong correlation between low confidence and 'don't know' responses, ($r = 0.94$, $p < 0.01$), and between high confidence and 'correct' responses, ($r = 0.51$, $p < 0.01$). Thus, children understood the confidence scale and employed it as a tool for revealing their memory, or lack of it.

Other observations about the use of the confidence scale and the corresponding responses can be made by examining the critical questions in more detail. Of the total number of don't know responses, 62.5% were elicited in response to the target questions, 57.1% of these were accompanied by a low confidence indicator, and 55% were from the omit group. There were 32 incorrect responses which elicited a high confidence indicator to the target questions, and most of these (59%) were elicited from the omit group. The group who had the target scenes omitted were responding with high confidence in their incorrect answers. As the confidence scale was well understood and employed correctly we suggest that this is further evidence of the target memory being inhibited. The confidence scale is discussed separately in more detail in chapter 5.

8.4 Discussion

To assess whether the children were recalling information from the original event or from PEI I presented children's use of first person pronouns during recall. The children consistently recalled information using personal pronouns and therefore I concluded that they were recalling from the original event. Children also included information unique to their own experience. The lack of differences between the control group who had no other information other than the original event and the repeat groups responses also suggests that they were recalling from the original event because the control group had no original information represented during PEI. Finally, it has previously been found that children will usually make a response if they possibly can in order to please an adult figure (Ceci & Bruck, 1993), so we can assume that if the children remembered the target scene from either the original event or from the PEI that they would have provided a response.

Drawing has been suggested as a possible recall aid during interviews with five to six year old children (Butler et al, 1995). Here, drawing during the interview increased the amount of information reported during free recall, without increasing the numbers of inaccuracies. This may be because children spent more time in the interview and therefore the quantity of their recall increased. Children may have felt more comfortable and in control of the interview process when drawing. Children generally report little information during free recall due to their reliance on external

retrieval cues. The visual representation of their drawing may have served as a retrieval cue and stimulated children's own related memories and increased their recall (Gross & Hayne, 1998).

There were no differences between drawing and telling for the direct questions, and accuracy was very high for both groups. This is a different result to that of Butler et al (1995), who found a facilitative effect of drawing during direct questioning. A likely reason for this is the difference in coding, and in question structure. In Butler and colleagues study for example the answer to the question "How did you get there?" was "by bus", the children in the verbalise condition would score one memory point for this correct response. However the children in the draw and verbalise group generally included statements about the colour of the bus, and the steering wheel etc, and all of these details were scored as additional memory points (Davison & Thomas, 2001). It is difficult to determine whether the children in Butler et al's study were reporting memories from the original event or whether the details that they report while they are drawing are based on the schematic representation of the item they are drawing. The structure of the direct questions in this study allowed for little expansion on the target answer. Most children stated one-word answers and did not elaborate on their responses regardless of their interview condition.

The most interesting and exciting result of this study was that a memory of a scene is less likely to be reported by children, if only that scene was omitted during PEI. Results revealed that it is possible

to reduce the likelihood that a child reports a scene from the original event, if that scene is not presented during PEI compared to a control group that have unrelated PEI. Other studies have reported no significant effects of 'erasing' memory in children (Pezdek & Roe, 1997). If other parts of the scripted event are reinstated it may be expected that this would lead to the target event being more likely to be recalled (Priestley, Roberts, & Pipe, 1999). Here, the target memory was less likely to be reported by the repetition of the non-target events and the omission of the target scene during PEI. By modifying the methodology that Pezdek and Roe (1997) used to attempt to inhibit the memory for a scene, we have shown that it is possible to make children's memories for a scene within an event less accessible by omitting information during PEI.

The results tally with the activation spread model (Ayers and Reder, 1998) coupled with Anderson and colleagues' findings on retrieval induced forgetting (Anderson, Bjork & Bjork, 1994; Anderson & McColloch, 1999; Anderson & Spellman, 1995). The original information is presented and connections are formed in memory during the original cooking event. The information that is shown during PEI further positively activates those items, and accordingly participants remember this information more accurately than do participants in the control group. However the excitation of these re-presented scenes inhibits the activation of the target scene, which is omitted in PEI, making it less likely to be recalled.

The results of this study can be tentatively applied to children's eyewitness testimony and in particular, to cases of child sexual abuse. For example, if a perpetrator of abuse continues to talk to a child about events surrounding the abuse, but omits the abusive event, then this memory may become less likely to be reported when children are asked directly about it. This comparison is made stronger because the handwashing scene was included in this study and it involved a 'touch', to which children have been shown to recall accurately (Goodman et al, 1995). However, the results revealed that it was possible to induce the children to not report a touching event by omitting it from a PEI review compared to the control group, suggesting that this could also be the case with abusive events that are not discussed.

Drawing during the interview did not influence the main findings of omitting a scene during PEI. Children were equally as likely to not report the target scene when asked directly about this scene if it was omitted during PEI regardless of whether they drew during the interview or not. This again strengthens the impact of this data and it's applications, as drawing during the interview has been shown to increase children's recall and accuracy (Butler et al, 1995). However it also raises the following important issue that is addressed in later studies in this thesis. It has been shown that it is possible to make a memory less likely to be reported and although this has benefits on the understanding of the child witness, it is not desirable that children's testimonies contain these types of errors. I found that

drawing during the interview did not negate the effect of omission; it is necessary therefore to determine how inaccessible these memories have become.

I also gained insight into the nature of the children's confidence in their answers. Allowing children to report that they do not know the answer to a question can be a difficult task, as children tend to be prone to making responses to please an adult, even if they are incorrect (Robinson & Briggs, 1997; Nesbitt & Markham, 1999). Telling children before an interview that it is OK to say 'don't know' can increase their accuracy, as children make more don't know responses. The confidence scale in this study provided a reminder at every stage of the questioning phase of the interview that it was OK to say 'don't know', by providing a physical indicator of confidence. The confidence scale was well understood and utilized by the children.

8.5 Conclusions

The data in this experiment support that drawing can be a useful recall aid. Drawing during the interview increased children's free recall, without increasing the amount of inaccuracies. Drawing did not have the same effect during direct recall, this was mainly due to the overall high accuracy in the direct recall stage.

The other issue that was addressed in this study, and that produced a strong new result was the possibility of inducing a memory to be less likely to be recalled. If the PEI includes a review of

all other scenes but no information about one particular aspect of an event, then the data in this experiment suggest that the child is less likely to recall this aspect than if she/he had not encountered any relevant PEI at all. This has important ramifications for both psychological theory and for applications. With respect to theory, it shows that memories for real scenes can be made less accessible.

In terms of applications, the findings are important for children's eyewitness testimony.

Chapter 4

Omitting a scene from a PEI review makes that scene less likely to be recalled: A systematic investigation of this effect.

Exp.3 revealed that omitting one scene during a PEI review of an original event reduces the likelihood that this scene will be recalled during questioning when the responses are compared to a control group that have no information repeated in PEI. As this finding has not previously been reported in the literature, it is important that the effect is replicated, and the following two experiments address this aim. The second aim of these experiments is to investigate how inaccessible the inhibited memories have become. This provides the basic rationale for the following two experiments.

Experiment 4

9.1 Introduction

Pezdek and Roe (1997) were the first to attempt unsuccessfully to decrease the likelihood that children would recall a scene from an event, using PEI methodology. In Exp.3, by altering Pezdek and Roe's (1997) methodology and including an omission condition I found that children were less likely to recall a scene if it was omitted during PEI compared to controls who had no information represented during PEI.

A body of literature has revealed that the act of remembering can, in some cases, be responsible for the forgetting of related experiences. Termed 'retrieval induced forgetting'; it has been shown to exist in many domains including episodic memory tasks for category name exemplars (Anderson et al, 1994; Anderson & Spellman, 1995). In a series of experiments Anderson and colleagues had adult participants learn a combination of exemplars to a particular category, half of these category-exemplars were practised in a retrieval phase. During the test phase participants retrieved the practised exemplars more often than the unpractised items. This was still the case when both the absolute and proportional scores were taken into account. The authors suggested that this was evidence of impairment as a function of exemplar strength, and that retrieval-induced forgetting had taken place.

The retrieval induced forgetting literature can also be applied to account for the results in Exp.3. Assume that the repetition of the non-critical scenes in PEI are analogous to the practised items in Anderson and colleagues' experiments. The successful retrieval of these non-critical scenes (practised items) may account for the inaccurate recall of the target scenes (analogous to the non-practiced items in Anderson's studies). Thus, one can deduce that the repetition of some of the scenes from the original event during PEI directly led to the inhibition of the target scene.

Ayers and Reder (1998) used their model to explain the misinformation effect, the strength of each concept and its strength of association to other concepts determining the likelihood of its recall (a more detailed account of this theory is included in chapter 1). In terms of the successful inhibition and reduced recall of an omitted scene in PEI, the activation-spread model seems to provide a convincing explanation. Concepts and connections are formed in memory when the original event takes place. The repetition of some of these scenes in PEI further positively activates and makes these connections stronger, so that they are more likely to be recalled. The target scene does not receive any positive activation because of its omission during PEI and is thus less likely to be recalled because the positively activated concepts are stronger than the target concept (see figure 6).

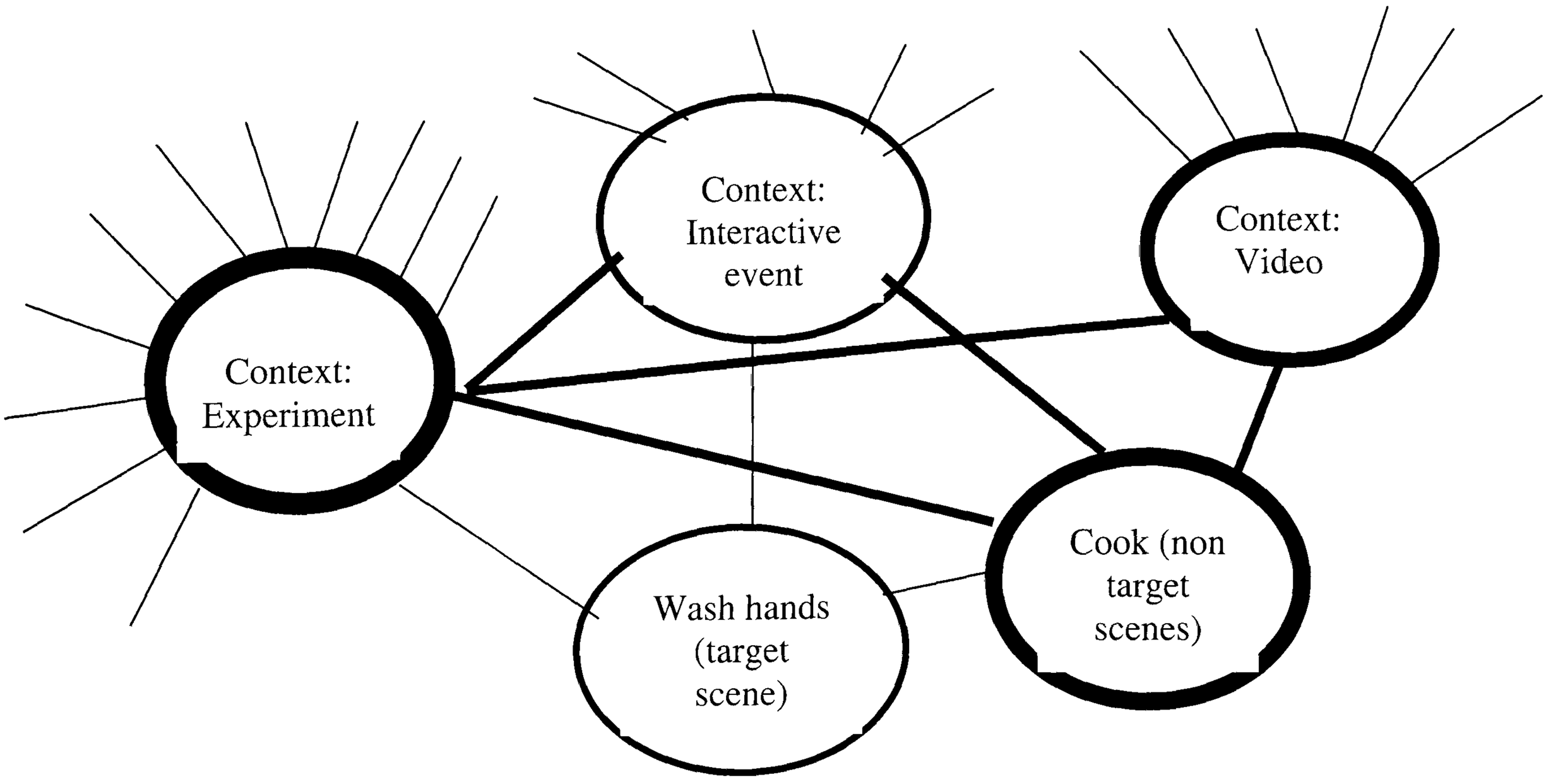

Figure 6. A schematic representation of the interactive event and the PEI video used in Exp.3 and in this experiment. An illustration of part of the memory structure used in the activation-spread models. Nodes (ovals) represent semantic concepts and links (lines) represent associations between concepts.

It is important to test the extent to which our successful omission effect is replicated, since it has not been reported anywhere else in the literature. The methodology in this study follows exactly that of Exp.3 to achieve this aim. It was important to keep the encoding time of the original event the same as Exp.3 and to ensure that the event was interactive and involved a touching scene.

The next important step came from a) whether the memories have become inhibited to b) assessing how inhibited these memories have become. It is important that children's testimonies do not contain these types of errors in the real world. Aim b) can be achieved by attempting to retrieve memories that have been successfully inhibited. Frost and Weaver (1997) found that when information has been encoded well, the misinformation effect could be significantly eliminated through cueing. Frost and Weaver (1997) concluded that misinformation affected the <u>accessibility</u> of information and not the <u>availability</u> of the information. The original event in the present study is well encoded, if Frost and Weaver (1997) were correct, it should be possible to eliminate the omission

effect by providing cues that activate the memory of the inhibited scenes. Object cues have been suggested as possible aids to recall. We have discussed the findings of the effectiveness of cues in detail previously, but it is appropriate to recap on some of the strongest and most relevant studies here.

It is the belief of some researchers that props and object cues may increase the detail and accuracy of children's reports. Young children are more reliant on external retrieval cues for event recall than older children (Fivush, Gray, & Fromhoff, 1987; Price & Goodman, 1990), being less proficient in the use of their own internal retrieval cues (Zaragoza, 1987). Providing non-verbal cues for children during the interview can help with high linguistic demands that are placed on a child during an interview, and can also help to overcome the potentially limited verbal skills of young children (Smith, Ratner, & Hobart, 1987).

Gee and Pipe (1995) investigated the effect of object cues on children's prompted recall. They found a facilitative effect of object cues particularly for younger children and for those children who had participated in an event rather than observed it. It has also been shown that real object cues from an event are more effective retrieval cues than are toy props (Salmon et al, 1995), but that this is not an effect that is consistent over a long delay (Salmon & Pipe, 1997). Consequently real object cues that were present at the original event were used in the present study.

In summary, the present experiment aimed to replicate the omission findings of Exp.3. I expected that the group who had information omitted in PEI would recall the target scenes less than the control group. During the interview, two phases were introduced where object cues were shown to children to aid their recall. The aim of this was to provide an indication of whether the omit group's memory for the target scene had become as inaccessible as the control group's memory for this scene. I predict that the omit group will be aided more by the object cues than the control group. The prompt from the object cues may lead to the increased activation of the connections between the target memory and the non-critical repeated scenes for the omit group, making the target memory more likely to be recalled for the omit group than for the control group.

9.2 Method

9.2.1 Participants

A school in Bristol was approached and agreed to participate in this experiment. Parental consent forms were given to the school. Forty-eight children aged five and six years agreed to participate (mean age = 71 months, SD = 3 months).

9.2.2 Materials

The original event involved children taking part in a cooking event with the experimenter who dressed up and took on the persona of Mrs. Flour. The cooking event was exactly the same as in

Exp.3, and therefore the materials included the cooking ingredients, outfit etc, as in Exp.3 (see Table 1, chapter 2).

9.2.3 Procedure

The experimenter spent one morning in each of the three schools, familiarising herself with the children and the school environment. The original event involved children taking part in a cooking event in small groups. The children entered a room where the disguised experimenter introduced herself as a cook called "Mrs. Flour". Efforts were taken to disguise the experimenter as Mrs Flour (she wore a large hat, glasses, a flowery dress and apron) and the experimenter took on the persona of the cook, encouraging children not to associate her with the experimenter they had seen earlier. She asked the children their names and if they would like to have a tea party. Mrs Flour and the children then discussed what the rules of the activity would be, placing particular emphasis on listening and looking at everything that happened during the cooking time, to ensure that their cakes would taste nice. The participants were asked to find a space around the table where a plastic cup and paper cake case had been placed. All children took part in a scripted cooking event in which they eventually produced a small chocolate cake. The event consisted of a series of seven steps that are detailed in table 1 (chapter 2) each child completed these regardless of their final test conditions. (One of the scenes, scene 2 from Exp.3 was taken out of this experiment, as it proved too difficult to find object cues to prompt the memory for

this scene when the children were later questioned). After the cake making had taken place, the children sat together and had a tea party. The incident lasted approximately thirty minutes. The children were then thanked and given a sticker, before returning to their classrooms.

PEI was shown to the children on the following day, the PEI conditions included a control group and an experimental omit group. There were a total of thirty-two children in the omit group, half of these had one of the target scenes (scene 2) omitted and half had the other target scene (scene 6) omitted from the PEI review A repeat group was included by default but the data was not extracted or analysed due to the consistent and well known effect of the repetition of information increasing the likelihood that that information is recalled when it is compared to no repetition.

PEI was presented in a different room to the original event and the children watched a short video. The children were reminded of the rules by the experimenter, which were to be very quiet, to listen to and to watch the video very carefully. Depending on their testing group, the children watched one of three videos, two of these included the same sequence of events that they had been exposed to the previous day, with the appropriate "target" scene having being omitted using the Adobe Premiere 4.2 computer program. The target scenes were when Mrs. Flour moved her recipe book onto the chair (scene 3 in Table 1 chapter 2), and when Mrs. Flour washed each of the children's hands before they

ate their cakes (scene 7 in Table 1 chapter 2). These scenes were both relevant to the script of cooking, and were chosen due to the fact that one involved a touch. The control group also watched a short video, for the same amount of time (approximately seven minutes). It shared no similarity with the original event, and consisted of a song about the alphabet ("Fun with ABC", 1997).

After a delay of approximately thirty-five minutes the experimenter individually interviewed the children. The interview took place in a different room to where the original event had taken place and to where the PEI videos had been shown to eliminate any context effects on recall. The experimenter engaged in a conversation with the child about their present classroom activities to build up a rapport with the child. When the child appeared comfortable, the experimenter explained that she would ask them a few questions and that it was O.K. to say that they did not know the answer to a question if they could not remember it. The child was asked one free recall question which was; "yesterday you got a sticker like this one (she showed a similar sticker). Can you tell me everything you can remember about that?" The child began their recall, which was transcribed and audiotaped. The experimenter provided little input except to encourage more recall by saying "really?" and "anything else?"

When free recall had finished, the experimenter told each child that they would be asked some questions and that if they did not know the answer then it was O.K and that they should tell the

experimenter and she would show them something that might help them to remember. The children were asked seven questions corresponding to the seven scenes in the original event, including two questions relating to the two target scenes. If the child responded with an incorrect answer, or did not know the answer they were provided with an object cue and asked the question again. If they again failed to recall the correct answer they were provided with a further cue and asked the question again. The cues were objects which were present during the corresponding scene in the original event (see Table 3). If with the presence of two cues the child still failed to recall the correct answer then the response was coded as incorrect or don't know. After the questions had been asked the child was thanked and told that they had helped the experimenter to understand more about what children can remember, they then returned to their classrooms.

Question	Target	Cue 1	Cue 2
Mrs. Flour was wearing a flowery dress, glasses and an apron, what else was she wearing?	Hat	Glasses	Apron
What did Mrs. Flour do with her recipe book?	Put on chair	Table	Recipe book
What did you use to pour the rice crispies into?	Cup	Rice crispy	Rice crispy box
What did Mrs. Flour pour into the bowl with the rice crispies?	Chocolate	Little dish	Bowl
What did you put your cakes onto to let them cool down?	Tray	Sticker	Name on sticker
What did Mrs. Flour help you to do after you had finished making the cakes?	Wash hands	Towel	Soap
What happened to the cakes in the end?	Ate them	Plate	Cake

Table 3. The questions, target answers and object cues.

9.3 Results

Participants were interviewed, and provided verbal spontaneous free recall to one overall question and directed recall in response to seven direct questions about the previous days interactive cooking activity with Mrs. Flour. When the children answered incorrectly or revealed that they did not know the answer to a question they were provided with object cues from the original event to help them to remember. The level at which the child recalled the correct answer was also analyzed as a possible indicator of the strength of any inhibition effect.

9.3.1 Conforming to Task Demands

It was crucially important to ensure that the children were genuinely recalling their memories of the original event, and to eliminate the possibility that they were recalling memories based on the information they watched in the PEI video (and choosing not to recall the target memory because they did not remember seeing this in the video). There was not a single use of a third person pronoun. All of the recall protocols were reported using first person pronouns, and they were reported this way consistently throughout the recall protocols. There were only two children who did not provide any information at all during free recall, and did not therefore use first person pronouns. Children also provided information unique to their own individual experience of the original event. I conclude that the children were recalling information about their original experience of the interactive cooking event with Mrs. Flour. This replicates the data on conforming to task demands from Exp.3.

9.3.2 Free Recall

The number of correct and incorrect free recall were calculated for each participant. The results were in the expected directions; the experimental omit group (M = 5.9, S.D = 4.4) benefited from the repetition of most of the scenes during PEI and provided more free recall than the control group (M = 4.5, S.D = 3.9) who had nothing repeated. However a one-way analysis of

variance revealed that the difference between the control and the experimental omit group was not significant ($F(1, 31) = 0.89$, $p = 0.35$).

There were very few inaccurate responses to the free recall question, in total there were seven, and these were elicited by the experimental group, who did provide slightly more information than the control group. During free recall the target scenes were recalled on only two occasions, one of these was by the control group and the other was by the experimental group.

9.3.3 Direct Recall

Responses to seven direct questions were coded as correct, incorrect or don't know. Five of these direct questions were non-critical, and had previously been rated by developmental psychologists as being of high low salience, (see Exp.3). Overall, accuracy was high for these non-critical questions ($M = 4.44$, $SD = 0.24$) for the control group, and ($M = 4.19$, $SD = 0.31$) for the omit group, suggesting that the representation of scenes during PEI did not make these scenes more likely to be recalled during questioning. This finding also demonstrates the effectiveness of providing young children with explicit retrieval cues in the form of direct questions. Unlike Exp.3, the control group in this study were just as accurate in response to questions which were considered highly salient (Q7, Q4 and Q1) and to questions considered less salient (Q4 and Q6) (note: Q2 from Exp.3 was eliminated from the questioning phase of this study) (see figure 7).

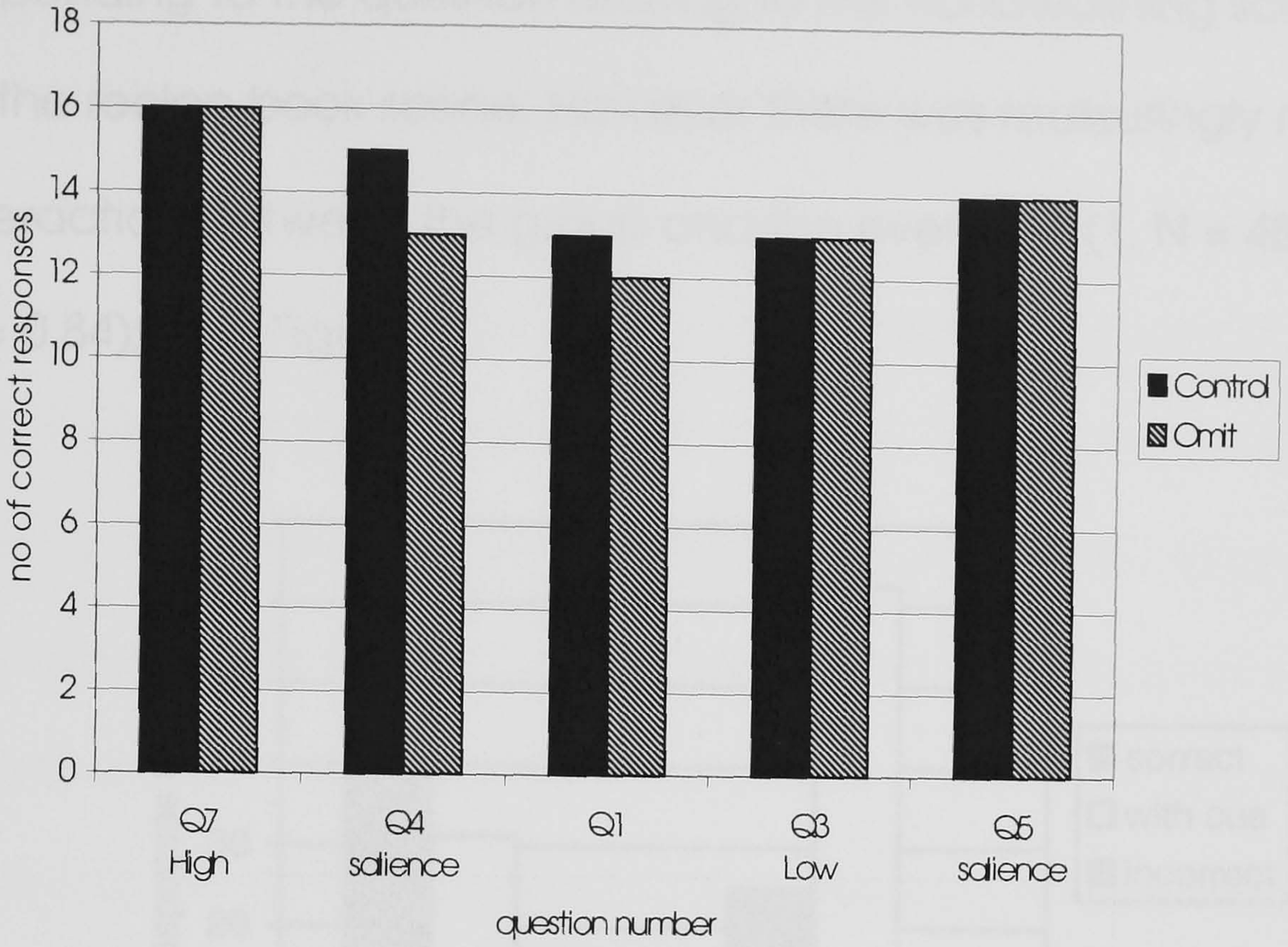

Figure 7. Correct responses to the non-critical questions by the control and omit group.

Questions 2 and 5 (see table 3) were the target questions, and it is these that we concentrate on with logistic regression analysis. The children who had a target scene omitted during PEI were expected (from Exp.3) to be less accurate in responding to a question relating to that scene. In line with these predictions, the PEI group was a significant factor in the likelihood of the recall of the target scene, the omit group being less likely to recall it than the control group (χ^2 (1, N = 48) = 4.04, p = 0.045). However unlike Exp.3, the target scene also had a significant effect on the likelihood of

yielding a correct response to the related target question (χ^2 (1, N = 48) = 9.64, p <0.01). Overall children were less accurate in responding to the question relating to the handwashing scene than to the recipe book scene. However there was reassuringly no interaction between the group and the event, (χ^2 (1, N = 48) = 0.04, p = 0.84); (see Figure 8).

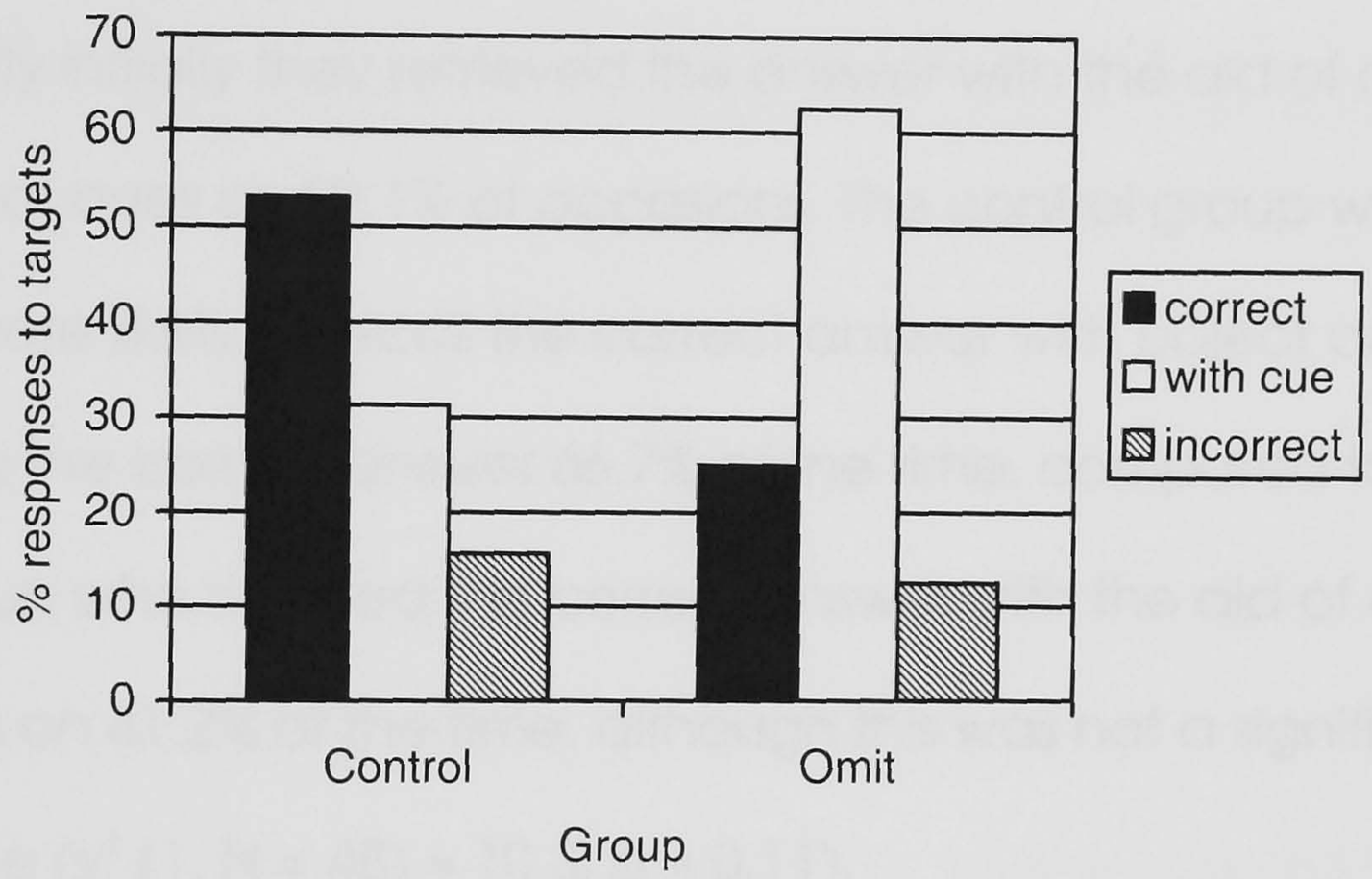

Figure 8. Overall the omit group are less accurate than the control group in response to the target questions. The omit group are likely to recall the correct answer with the aid of either 1 or 2 object cues.

9.3.4 Cues

Initially, if the children failed to retrieve the correct answer to a direct question, they were shown an object cue present in the corresponding scene during the original event and they were asked the question again. If the answer was again not recalled correctly,

the children were shown another object cue and were asked the question again. Failure to retrieve the correct answer with the aid of two cues indicated that the children did not know the answer, and the response was coded as either incorrect or don't know. It has already been shown that responses elicited from the non-critical direct questions were very accurate (see table 5), overall 13.7% of responses were not correct initially. When children responded incorrectly initially they retrieved the answer with the aid of one or two object cues on 59.1% of occasions. The control group were slightly more likely to recall the correct answer with object cues, retrieving the correct answer 66.7% of the time, compared to the omit group who recalled the correct answer with the aid of one or two cues on 41.2% of the time, although this was not a significant difference (χ^2 (1, N = 48) = 10.3; p = 0.11).

The main interest here is in the two target questions and more specifically in whether the omit group benefit from the aid of object cues more than the children in the control group. Children in the omit group who answered the target question incorrectly initially, retrieved a correct answer with the aid of the object cues on 83.3% of occasions. The control group was also aided by the presence of object cues when they originally provided an incorrect response, and retrieved a correct answer 66.7% of the time. The control group remained incorrect more often, 33.3% of the time, than the omit group who remained incorrect on 16.7% of occasions (Table 4).

	Control	Omit
Initially incorrect	15 (46.9%)	24 (75%)
Correct with clue	10 (66.7%)	20 (83.3%)
Incorrect	5 (33.3%)	4 (16.7%)

Table 4. The top line shows the total amount of incorrect responses to both target questions elicited by the control and omit group. The second line shows the amount of responses correctly retrieved with the aid of object cues. The third line is the amount of responses that remain incorrect.

Chi square tests were carried out on the responses to the individual questions. For the question relating to the recipe book there was a significant difference between the responses that required cues and the experimental groups ($\chi^2(1, N = 32) = 10.7$, $p < 0.01$). The omit group were more likely to recall the correct answer with the aid of object cues. However, there were no significant differences between the groups and the likelihood of recalling the correct answer with the aid of object cues and the responses to the question relating to the handwashing scene ($\chi^2(1, N = 32) = 0.58$, $p =$

0.45). This is mainly due to the fact that the control group were very inaccurate when responding to the question relating to the handwashing scene.

9.4 Discussion

The omission effect of Exp.3 was successfully replicated in this experiment. The same interactive event was used, and the procedure was exactly the same as in Exp.3. Omitting one scene from a PEI review of the original interactive event with Mrs. Flour, made it less likely that this scene will be recalled when children are later questioned about it, compared to controls who have no information repeated during PEI. In Exp.3 I explained the inhibition of a memory by combining the retrieval induced forgetting literature (Anderson et al, 1994; Anderson & Spellman, 1995; Anderson & McColloch, 1999) with Ayers and Reder's (1998) activation spread model. For the omit group, the memory for the target scene is less likely to be recalled due to the lack of activation it receives as a consequence of the positive activation that the remaining scenes receive during their repetition in PEI. I have previously discussed the important theoretical implications of these data in terms of our further understanding of the child witness. The data may also be applied to children's eyewitness testimony, particularly to cases involving abuse, where the adult discusses some aspects of the event but fails to discuss aspects of the abusive event with the child, thereby potentially making it less likely that this memory will be recalled.

In this study two target scenes were included, one of which involved a touch (the handwashing scene). Contrary to expectations from Exp.3, the type of target scene was a significant factor in this experiment. Answers to the question relating to the recipe book scene were similar to the results in Exp.3, but the responses to the question relating to the handwashing scene were particularly inaccurate. The omit group's recall of the handwashing scene was at floor levels. Although it is known that children are reluctant to disclose information about events involving their own bodies, they are usually accurate when questioned directly (Goodman et al, 1991). I would also expect that the presence of even stronger retrieval cues in the object cues (which included the towel and soap that were used to wash and dry their hands) might have provided the children with a structure to recall the correct answer. In support of this, a high percentage of the children did recall the correct answer with the aid of the object cues (62.5% in the control group and 75% in the omit group).

I assessed children's use of personal pronouns when recalling the event during the interview to confirm that the children were recalling information from their experience of the original event. In accordance with the findings of the first experiment all of the children's recall protocols were reported using first person pronouns, I concluded therefore that children were reporting their experience of the original event, and were not recalling information from the PEI video.

The present study also addressed the depth of the inaccessibility of the target memories that resulted from the omission effect. When children initially answered a target question incorrectly or did not know the answer, an object cue was presented to the children and they were given opportunity to retrieve the correct answer. If the child responded incorrectly, or did not know the answer, they were shown another object cue and given further opportunity to respond. In both groups the children benefited from the presence of the cues and a high number of children in both groups recalled the correct answer. It has been shown that children are accurate in responding to direct questions, due to their reliance on external retrieval cues (Ceci & Bruck, 1993). The suggestion that follows from our findings is that a direct question is not an effective enough external retrieval cue to activate the memory of an inhibited scene for children in both groups. However, the presence of an object cue is indeed sufficient enough and effective in activating the memory for an inhibited scene for children in the control and the omit group.

The interesting result here is that overall the omit group only failed to recall the correct answer 16.7% of the time, and that the control group remained inaccurate more often; 33.3% of the time. I have shown that memories rendered inaccessible by omitted information are not 'erased' and that they are not forgotten, but that they can be recalled with the aid of relatively simple object

cues. This is a positive step in furthering our understanding of the capabilities of the child witness.

Schema theory (Rumelhart & Norman; 1983) can also provide a relevant explanation for these results. The schemas originally created at the time of encoding either become activated or are not activated at the retrieval stage determining whether memories will be recalled or not. If a certain schema is not activated and then an object cue is introduced that directly activates the appropriate schema then this additional information will be recalled. This provides further evidence to suggest that some of the information that is originally not recalled has not been forgotten and still exists in memory and that an appropriate stimulus can activate further schemata that can subsequently increase recall.

However these results still leave an open question about exactly how inaccessible the inhibited target scene has become. In terms of applying the results of these data, children who do not report abusive events when questioned during free recall or directly may not do so because abusive events are not discussed (omitted) but the surrounding events before and after the event are. The data in this study suggest that an abusive memory, inhibited by its omission is not totally inaccessible, and that the presence of a retrieval cue equivalent to that of the object cues in this study may aid its subsequent recall.

Experiment 5

10.1 Introduction

In Exp.3 and 4 the omission of a scene during PEI resulted in that scene being less likely to be recalled when children were asked directly about it compared to a control group. Both of these experiments involved children taking part in an interactive original event, primarily because children are more accurate when answering questions about an event in which they actually participated (Goodman et al, 1991). In the present experiment the original event was not interactive and it involved the child listening to a story about other people's actions. The reason for moving to a non-interactive event was for generality, as follows.

Child witnesses are not always victims of crime, they can be required to testify about incidents that they overheard or witnessed. If these third party memories are also susceptible to the omission effect it will provide us with more theoretical insight into the nature of what children are likely not to talk about and the applications of this. Children have been shown to be accurate when responding to questions relating to an event presented to them in story format if it is a plausible event, they are also less likely to succumb to false suggestions regarding that event (Pezdek & Hodge, 1999). Bates, Ricciardelli & Clarke (1999) compared the recall of children aged five to six years and eleven to twelve years in response to events where a person participated in the event or where the event was

presented via video recording. Their results indicated that both the younger and the older children reported more information when the event involved the participation of the children in comparison to when it was presented via video recording. In their study Murachver, Pipe, Gordon, Owens and Fivush (1996) compared the recall of children aged five to six years when they experienced an event through direct experience, by observation, or by listening to a story. They found that reports were more accurate and recalled logically (schematically) when children experienced the event directly compared to when the event was observed or heard about.

Camparo et al (2001) interviewed children about real and fictitious events and concluded that children were more accurate in responding to a real staged event. The children in their study accurately denied that a fictitious event had not occurred when it was described to them, but after repeated prompting a high percentage (over 20%) provided false recall about the fictitious event. In the following study children are repeatedly prompted during the interview when they respond incorrectly, it may be therefore that the more prompts children require, the more inaccurate their answers become. In Camparo et al's (2001) study however the prompts were presented verbally, in this experiment blurred picture cues are used.

In addition to the lack of interaction in the original event in this study, the encoding time for the original event also differed. In

the previous two experiments the cooking event with Mrs. Flour lasted approximately twenty minutes. In this experiment the time of encoding for the original event is only about seven minutes. Frost and Weaver (1997) investigated differences in encoding time on the misinformation effect. They found that with a longer encoding time the misinformation effect could be eliminated through cueing. However a shorter encoding time leads to a large misinformation effect which could not be eliminated by cueing, suggesting that the information was not available in memory. If this follows, and because of the shorter encoding time the original information is not well encoded in this study, we may expect that there will be no differences between the control and omit groups' performance and that the target information will be unavailable and not inaccessible.

In summary then, the aim of the present experiment was to investigate the likelihood of an omission effect with a non-interactive event; and the null hypothesis is that there will be no differences between participants that have PEI presented to them with information omitted and those who have no information omitted.

In the previous two experiments different retrieval cues were introduced in an attempt to reduce the omission effect, or to provide an indication about the depth of the inaccessibility of the memories. In Exp.3 drawing during the interview did not reduce the omission effect, which was as likely to occur whether the children drew during the interview or not. Exp. 4 suggested that the

introduction of object cues and of repeated questioning during the interview increased the likelihood that the omitted information would be recalled. However this was not a strong effect and in this experiment we included a phase during the interview where blurred picture cues and a recognition phase were introduced as retrieval aids.

The inclusion of blurred pictures as retrieval cues in this experiment was inspired by Potter's (1966) early work on perceptual recognition. In her experiments she looked into aspects of recognition by presenting her participants with blurred pictures and gradually bringing them into focus until recognition was achieved. There have been very few studies that have involved the use of blurred pictures as retrieval cues in an eyewitness paradigm. They are included in this study as a method of understanding the cognitive abilities of children. In the real world their use is limited except in some cases where poor quality photographs (or partial photographs) are introduced in interviews as evidence in court cases. Aschermann et al (1998) investigated the use of photographs as retrieval cues for young children. In their study they interviewed children about a fishing game in which they had participated ten days earlier. All of the groups were given a context reinstatement instruction. Additionally two of the groups were provided with photographs during the interview, and one of the groups received training in the use of photographs. Their findings revealed that children who were provided with photographs gave more accurate

recall than those in the context reinstatement group, and that those who were given training in the use of photographs as retrieval aids were the most accurate.

There have been a number of studies that have addressed the perceptual and cognitive aspects of picture naming and recognition. For example Bacharach et al (1976) found that children who had been previously exposed to pictures were more likely to recall and recognise the focal aspects of the picture than the non-focal aspects. In an eyewitness context, providing children with pictures to aid their recall may increase children's recall of certain focal aspects of an event. The negative consequences of providing pictures as retrieval cues may be the child's failure to recall other non-focal aspects of the event. In a more recent study Drummey and Newcombe (1995) used the recognition of blurred and fully focused pictures to assess children's implicit and explicit memories for pictures. Children as young as three years had an advantage in recognising the blurred versions of pictures which they had seen previously (also see Potter, 1966). This evidence from other areas of child development leads me to include blurred picture cues during the interview in this study for exploratory purposes.

In summary this study aims to replicate the omission effect with a non-interactive event. Blurred picture cues were also introduced in this experiment to assess the depth of any inaccessibility of the children's memory. My expectation is that the

omit group will benefit more from the introduction of blurred picture cues than the control group.

10.2 Method

10.2.1 Participants

Children were recruited from two primary schools in Bristol. Parental consent forms were made available to the school. Forty-eight children aged five and six years took part in this experiment (mean = 72 months, SD = 2).

10.2.2 Design

Children were assigned to a control group or to one of two experimental groups. The control group consisted of sixteen children who provided responses to both of the target questions (Q3 and Q7) producing a total of thirty-two responses. The other thirty-two children formed the omit and the repeat groups. Half (16) of the children had one of the target scenes (scene 3) omitted from a PEI review and had the other target scene (scene 7) repeated, and the remaining sixteen had the opposite (scene 7 omitted and scene 3 repeated in the PEI review). This resulted in the children in the experimental groups being included in both the repeat and omit groups, in relation to the two different target scenes producing thirty-two responses in total in both the repeat and the omit conditions.

10.2.3 Procedure

The experimenter spent a morning in each of the schools familiarising herself with the children. In groups of six or seven the children were told by the experimenter that they would be required to listen very carefully to a story, and to look at some pictures. Time was spent showing the children the laptop computer, and explaining to them how it worked so that this would not be a distraction during the story, this also served to settle the children before the story began. The children sat around the experimenter so that all could see the computer screen.

The original story of Mrs. Flour making cakes with a group of children was used in this experiment (see Exp.3). To accompany the story a still picture from the corresponding scene was shown to the children. This was a time consuming and complicated design issue as it involved capturing the appropriate freeze frame from the video of each of the scenes using the Adobe premier computer program. Each picture corresponded to one of the eight scenes, including the two target scenes (target 1; the recipe book was moved onto the chair and target 2; the children's' hands were washed, see table 1 chapter 2). The pictures were then combined in sequence and a computer programme was designed to allow each of the pictures to be shown in sequence, to the response of a touch of a button on a laptop. The original event then, consisted of a story about Mrs. Flour making cakes with a girl and was read by the experimenter. Each of the pictures corresponding to each of

the eight scenes in the original event were presented to the children via laptop at the appropriate time. All of the pictures were displayed for approximately forty-five seconds each. After the story was completed the children were thanked and they returned to their classrooms.

The following day, PEI was presented to the children in their same groups but in a different room to where the original story had been presented. The PEI videos were exactly the same as the videos that had been used in Exp.3. The children were told that they would watch a short video. Again emphasis was placed on listening and watching everything in the video very carefully. The children were randomly assigned to either one of two experimental PEI groups; repeat or omit, or to a control PEI group. According to these groups the children watched one of three PEI videos, the experimental groups watched PEI videos which were based on the original story of Mrs. Flour. There were a total of thirty two children in the omit group, half of these watched a video with one of the target scenes (scene 3) omitted, and half had the other target scene (scene 7) omitted. When the children had one of the target scenes omitted from the PEI video, the other target scene was repeated. This resulted in the children being included in both the repeat and omit groups, in relation to the two target scenes. The control group watched an unrelated PEI video for the same amount of time (approximately seven minutes) that consisted of a short song about the alphabet (fun with ABC).

After the PEI had been shown to the children, the confidence scale was explained to them (see Exp.2 and 3 for more details). The confidence scale was included primarily to allow the children to report that they did not know the answer to a question, but also with the aim of replicating its' usefulness from the previous experiments. The training session was also the same as in previous experiments. The experimenter explained the meanings of the three different sized blocks as implying high confidence, middle confidence, and low confidence, and gave the children examples of its use by asking herself questions for which her confidence in her answered varied. The children were told that they would be asked some questions and that some of them might be quite hard and that it was O.K to say, and indicate with the smallest block, that they did not know the answer to a question. The children then took turns in answering questions and in identifying pictures from the BPVS and used the confidence scale to indicate to the experimenter how confident they were in their own responses. When it was clear that the children understood the scale and more importantly that they were aware that it was ok to say that they did not know the answer to a question they returned to their classrooms.

After a short delay of about thirty minutes, each child was called out individually to take part in the interview. This was conducted in a different room to where the original event and the presentation of PEI had taken place to eliminate any context effects. The experimenter engaged in conversation about the

child's current classroom activity to build up rapport with the child and then informed them that she was going to ask them a few questions and that it was O.K to say that they did not remember the answer to a question. The child was then asked one free recall question, which was, `can you tell me everything you can remember about the story of Mrs Flour?' The child began to verbally recall, this was transcribed by the experimenter and also recorded by audiotape. The experimenter prompted the child very little, asking `Can you remember anything else?' and expressing interest in what was recalled, `really?'

When the free recall report ended the experimenter told each child that she would ask some questions and that the child should answer them if they could remember the answer from the story, and if they didn't know the answer then it was ok to say that they don't know. She also asked the children to make use of the confidence scale and asked the child if they could remember and tell her the meanings of each of the three blocks. If a child did not remember the meanings, time was spent re-explaining the confidence scale. She told the children that sometimes they may be shown something on the laptop and asked the same question, and that this did not mean that they should change their answer if they were sure that remembered it very well. Each of the eight original still pictures captured from the video that were shown to the children during the original story were blurred to two different levels, using Microsoft Photo Editor (see figure 9)

Figure 9. Example of the three levels of blurred picture cues.

A computer programme was devised to reveal the two blurred images and the fully focussed original freeze frame to the children as and when they were required, in response to the touch of a button on the laptop. The children were then asked eight questions corresponding to the eight scenes in the original story (see table 2 in Chapter 2). If children responded incorrectly or reported that they did not know the answer to a question they were shown a very blurred version of the original picture corresponding to that scene on the laptop, and they were asked the question again. If the child again responded incorrectly, they were shown a less blurred version of the original picture and were asked the question again. If the child still answered incorrectly they were shown the original picture in full focus and asked the question again. If the child continued to respond incorrectly, their response was scored as incorrect or don't know. The interview was complete when the child had answered all eight questions. The children were given a sticker and thanked by the experimenter who told them that they had helped her to understand more about what children remember. The child then returned to their classroom.

10.3 Results

Participants were asked a free recall question and eight direct questions regarding their memory of the original story of Mrs. Flour making cakes. Responses were analyzed with the aim of replicating the omission finding of Exp.3 and 4. Recall protocols were analysed to detect whether the children made any

connection between Mrs. Flour (who they watched in the video) and the experimenter. None of the children mentioned the connection and during recall they did not use the pronoun "you" in reference to Mrs. Flour. So although potentially a confounding factor Mrs. Flour being the disguised experimenter did not seem to affect the results adversely. In this experiment if a child answered one of the direct questions incorrectly or with a don't know response, a blurred version of the original picture corresponding to the scene in question was shown to the children and they were asked the question again. This process was repeated if the children still failed to recall the correct answer. These responses were analyzed to assess whether the children who failed to recall an answer in the omit group recalled the answer with the aid of a cue more often than the control group.

10.3.1 Free Recall

A one-way analysis of variance revealed that children in the two experimental groups provided more correct free recall than did the control group, ($F(2, 47) = 5.30$, $p < 0.01$). This was expected because the children in the experimental groups had most of the scenes from the original story repeated during PEI, whereas the children in the control group had PEI that was unrelated to the original event (see figure 10). This was however a different result from Exp.3 and Exp. 4 where there had been no differences between the control and experimental groups. Children generally provide little information during free recall due to their reliance on

external retrieval cues. We can only assume that the repetition of the scenes during PEI helped the children to remember more information about the original event.

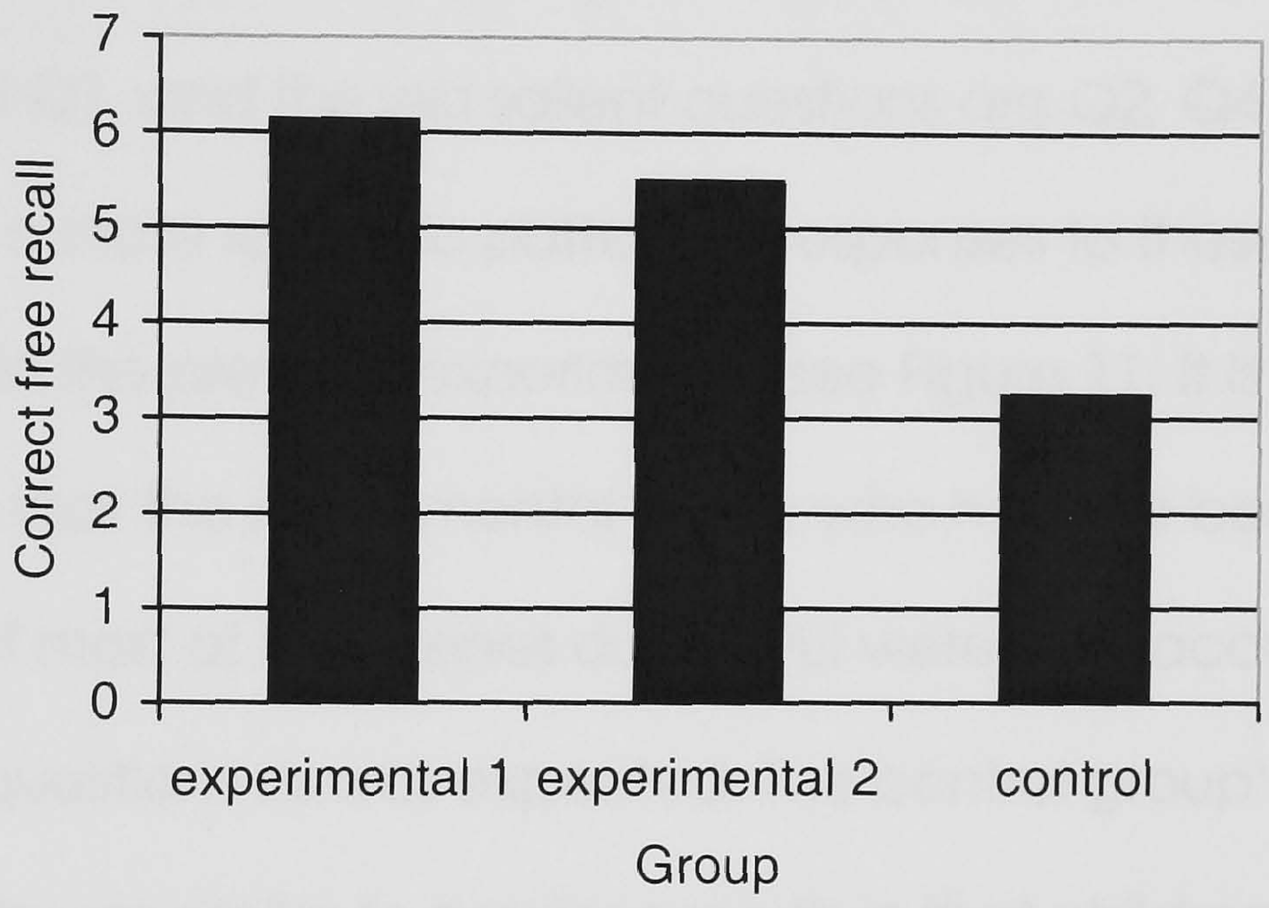

Figure 10. The amount of correct free recall elicited by children in the experimental groups and the control groups.

Only one child recalled the target scene relating to the recipe book scene, she was in the experimental group that had this scene repeated during PEI. Surprisingly, a high number of children recalled the target scene relating to the handwashing scene, 12 children remembered this during free recall. Half (6) of these children were in the repeat experimental group, 4 children in the control group remembered this scene, and only 2 children in the omit group recalled it. This is also a different result to that in Exp.3

and Exp. 4. Reasons for these different results are discussed later in the discussion.

10.3.2 Direct Recall

The responses to the eight direct questions were coded as a) correct, b) incorrect, or c) don't know. Six of these eight direct questions were non-critical, and had previously been identified as being of high or low salience, see Exp.3 (the highly salient questions are Q8, Q5 and Q1, and the less salient questions are Q2, Q4, and Q6). There was a more sporadic pattern of responses to these questions than in the previous experiments, see Figure 11. It is clear from the graph that the experimental group who had the benefit of the repetition of most of the scenes during PEI were very accurate to most of the questions as was expected. The control group's pattern of results was similar to previous results in that children were less accurate than the experimental group, but the data are not as clear as Exp.3 and Exp. 4. For example question 4 produced a very low amount of correct responses from the control group.

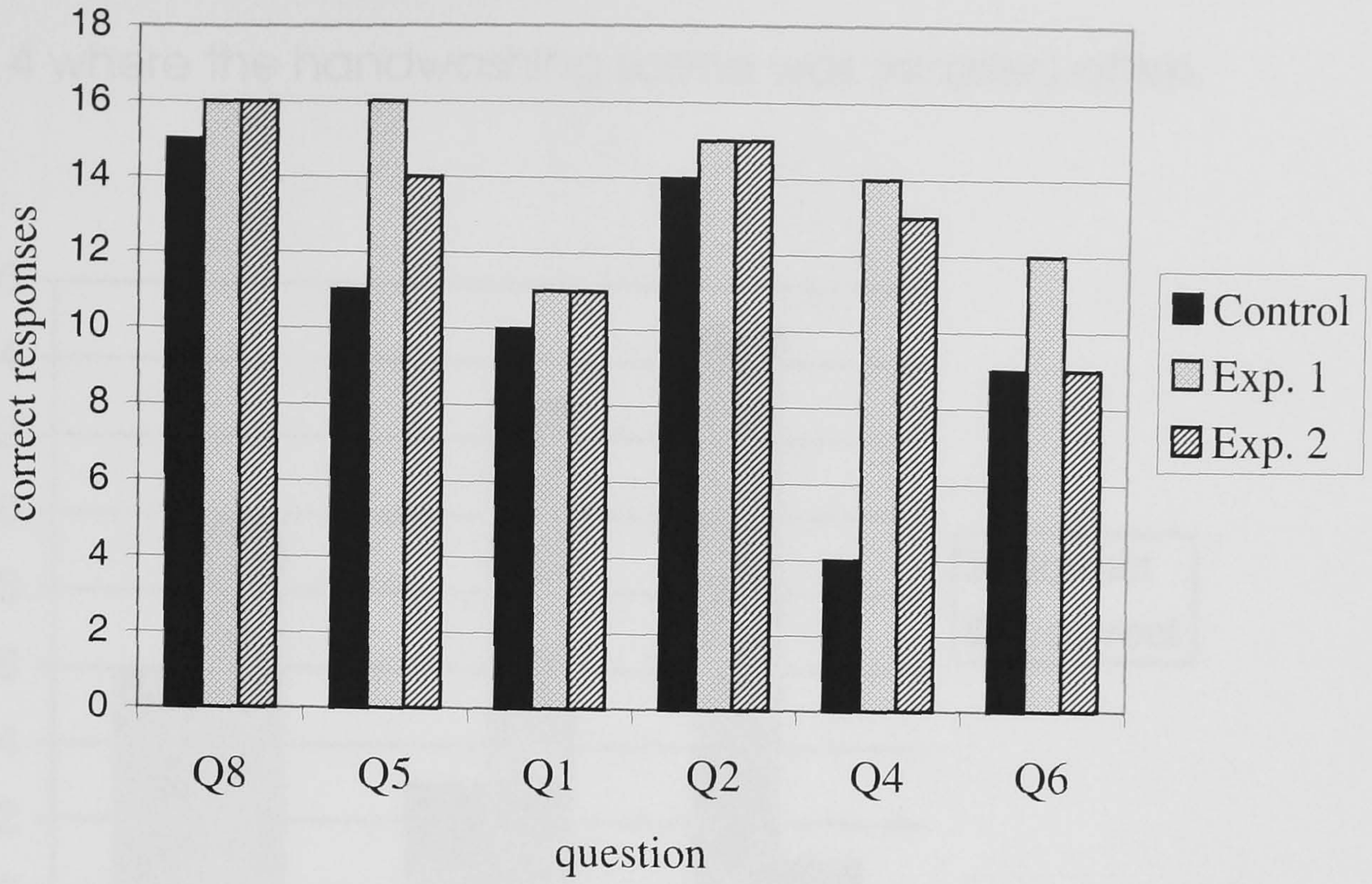

Figure 11. Correct responses to the non-critical direct questions. Questions 8,5, and 1 are highly salient questions and questions 2, 4 and 6 are less salient questions.

Turning our attention to the target questions, Q3 and Q7, it was expected that the omission effect discovered in Exp.3 and in Exp. 4 would be replicated in this experiment. However logistic regression analysis revealed that this was not the case, and that although the responses were in the expected direction, the assigned PEI group was not a significant factor in predicting the likelihood of whether the correct answer is recalled (χ (1, N = 64) = 1.84, p = 0.18), although this may be due to the small sample sizes. The type of question was not significant either (χ^2 (1, N = 64) = 0.07, p = 0.78), suggesting that both a touching and non- touching scene

produce similar results, this is in line with the results in Exp. 3 (but not in Exp. 4 where the handwashing scene was recalled often.

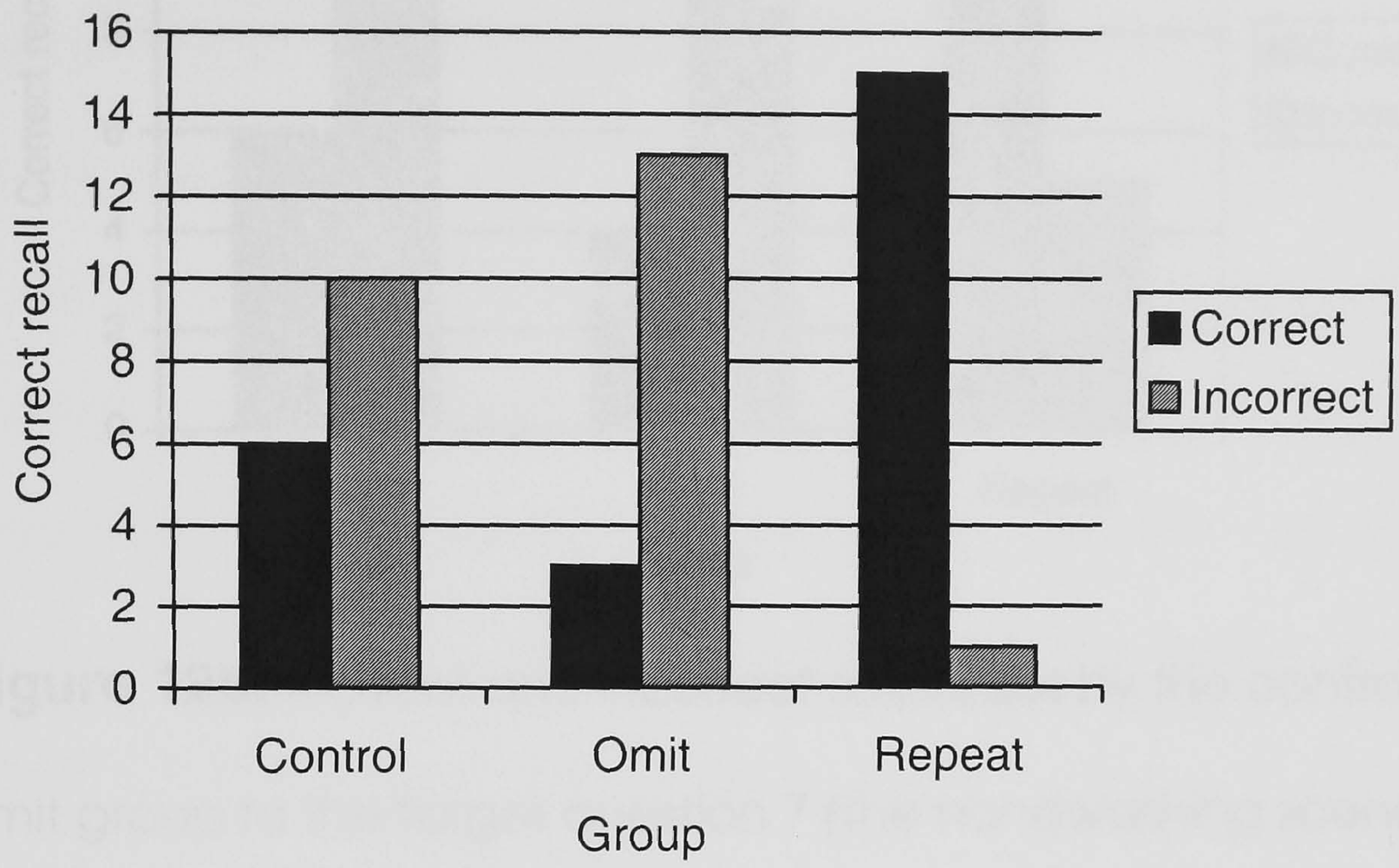

Figure 12a. Correct and incorrect responses by the control and omit group to the target question 3 (the recipe book scene).

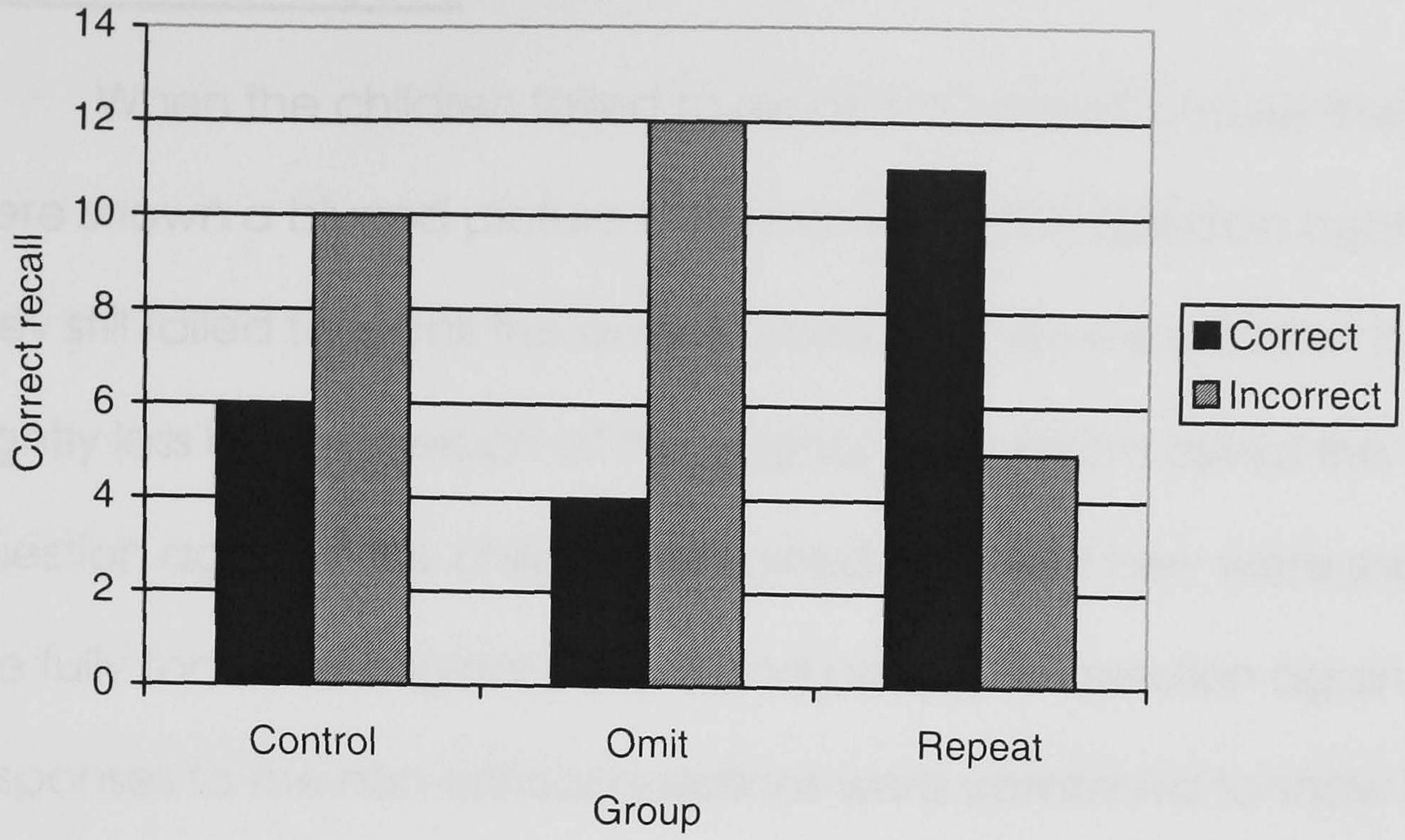

Figure 12b. Correct and incorrect responses by the control and omit group to the target question 7 (the handwashing scene).

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As can be seen from the graphs above Figure 12a and 12b the pattern of the results is the same in this experiment as the previous two in that the omit group are less accurate in response to the target questions than the control group. The main difference between this and the other experiments, (1 and 2), and the most likely reason for the lack of statistical significance is that the control group in this experiment are recalling the target scene less often than the control groups in the other experiments (in experiment one 53% of the control group answered the target questions correctly, in experiment 4 52% of the control group answered the target questions correctly, and in this experiment only 37% of the control group answered the target questions correctly).

10.3.3 Picture Cues

When the children failed to recall the correct answer they were shown a blurred picture cue and asked the question again. If they still failed to recall the answer correctly they were shown a slightly less blurred version of the original picture and asked the question again. If the children remained incorrect they were shown the fully focussed original picture and asked the question again. The responses to the non-critical questions were combined to show the total amount of incorrect responses, only 21.1% of answers were incorrect. To confirm, most of the incorrect answers, 54.1%, were elicited by the control group, compared to 16.4% incorrect answers from one experimental group and 29.5% in the other experimental group. The experimental groups were aided more by the blurred picture cues, retrieving the correct answer on average 94.5% of the time, in comparison to the control group who retrieved the correct answer on 51.5% of occasions. The remaining incorrect answers from the two experimental groups were recalled correctly with the aid of the third full focus picture cue, and 33% of the control group's previously incorrect responses were recalled correctly with the aid of the recognition cue. There was not a single child in either of the experimental groups that remained incorrect at the end of the interview, whereas 15.1% of the control group's responses remained incorrect.

It is difficult to make any conclusions about the effectiveness of the picture cues in terms of the target scenes because we did

not replicate the strong effect of omission in this experiment. The effects were in the expected directions and therefore it is important to identify whether the picture cues in this experiment aided the children in the omit group more than the children in the control group, thus allowing speculations about the depth of inaccessibility caused by omitting a scene. The responses to the two target questions were combined (see table 5).

	Repeat	Control	Omit
Initially incorrect	6 (6.2%)	20 (20.8%)	31 (32.3%)
Correct with blurred picture cues	4 (66.6%)	2 (10%)	7 (22.6%)
Correct with full focus picture cue	2 (33.3%)	13 (65%)	20 (64.5%)
Remain incorrect	0	5 (25%)	4 (12.9%)

Table 5. The raw and percentage scores for the incorrect responses to target questions. The top line refers to the total amount of incorrect responses. The second line is the amount of correct responses with the aid of blurred picture cues and the next line is the correct answers with full focus picture cues (recognition). The final line is the amount of responses that remain incorrect.

Table. 5 confirms that the omit group are the most inaccurate group overall providing a total of 32.3% incorrect answers. The repeat group benefits most from the presence of the blurred picture cues indicating that the memory from these can be easily re-

activated. The most interesting result here is that the omit group benefit from the presence of the blurred picture cues more often (22.6%) than the control group (10%), and the control group remain incorrect more often than the omit group even after having the recognition cue.

10.3.4 Confidence

Children's choice of confidence indicator was analysed. The scale was included mainly to allow children to report that they did not know the answer to a question. The accuracy of responses and the frequency of high and low confidence indications were combined to produce two overall scores. As expected high confidence was highly correlated with correct responses ($r = 0.68$, $p < 0.01$), and low confidence was highly correlated with don't know responses ($r = 0.72$, $p < 0.01$). Thus children understood and used the confidence scale to indicate that they knew or did not know the answer to a question. The use of the confidence scale and its effectiveness is discussed in detail in chapter 5.

10.4 Discussion

The main aim of this experiment was to replicate the omission finding of Exp.3 and 4 with a non-interactive event. The data were in the expected direction; the omit group were more inaccurate than the control group in response to both the recipe book question and the handwashing question. This seems to encourage the idea that omitting a scene from a PEI review of an event makes it less

likely that this scene will be recalled compared to a control group who receive no information during PEI. However the omission effect was not a significant one; I suggest that this may be due to two methodological reasons.

Firstly in this experiment the original event was not interactive. Children are more accurate when they respond to questions about a real event rather than a fictitious one (Bates et al, 1999; Camparo et al 2000; Murachver et al, 1996). In the previous experiments the original event has been a 'real' event as the children have actually participated in it, in this experiment the original event was a story and is therefore a 'fictitious' event. These classifications explain why my data may not have produced a significant effect, as the children were more inaccurate when answering questions about the 'fictitious' event in this study. It is also well documented that although children may be reluctant to talk about events involving their own bodies they are generally quite accurate in responding to questions about events in which they took part (Ceci & Bruck, 1995; Goodman et al, 1991). It may be the case that the strength of the omission effect increases when children interact in the original event.

The second possibility for the lack of a significant effect in this study may be due to the encoding time of the original event. In the two previous studies the original event has taken approximately twenty minutes to complete. In this study the presentation of the original event was about seven minutes. The argument therefore is

that the stronger the encoding of an event, the more likely the omission effect will occur when children are exposed to omitted information during PEI. Frost & Weaver (1997) found that the shorter the encoding time, the larger the misinformation effect. The authors suggested that this was due to the unavailability of information which suggests a lack of encoding. By its nature the omission effect in my studies requires information to be well encoded during the original presentation of an event for all of the groups. This is in order that a target scene will become more inaccessible when it is omitted from a review beyond that of the control group's memory of that same event. The control group in this study were more inaccurate than in the previous studies and this supports the suggestion that the original event was not well encoded. Further research combining and comparing the type of event and the length of the encoding process would confirm this and provide us with more understanding about these issues.

Despite this lack of significance, it is might be useful to make some speculations about the possible effectiveness of blurred picture cues as retrieval cues for children to guide future research if an effect turns up with an improved method. When a child responded incorrectly they were shown a blurred picture of the original picture from the initial event and asked the question again. If they failed to recall the correct answer they were shown a less blurred picture and asked the question again (this was the aided

retrieval stage). Finally the children were shown the full focus original picture and asked the question again (the recognition stage).

The data in our study revealed that blurred picture cues are effective in helping children to remember events that they do not recall when they are first questioned. Although this method has the potential to be used in laboratory experiments to enable wider understanding of the child witness, it is difficult to apply to real life examples of child witnesses, as the presence of pictures of a crime would be unlikely. The results indicate that the omit group are facilitated by the presence of the blurred picture cues more often than the control group for both the non-critical and the critical questions. This is similar to one of the omit groups in Exp. 4 who were facilitated more than the control group by the introduction of object cues during the interview. It seems that the memory for the target scene is easier to re-activate for the omit group than for the control group. My previous conclusion was that although the memory of an event can be less accessible as a result of its omission during PEI, it is not as inaccessible as when there is no relevant information during PEI, and is further supported by the data in this study.

In theoretical terms this provides us with evidence that it is possible to make the memory of a scene less likely to be recalled. It is well documented that children rely on external retrieval cues to recall detailed and accurate information. The results of this experiment suggest that direct questions are not sufficient to

eliminate the effects of omission, but that a more direct retrieval cue for example a blurred picture can be an effective enough retrieval cue to eliminate the effects of omission.

Chapter 5

The Confidence Scale

11.1 Introduction

It is important to note that when an eyewitness makes a response to a question it may be wrong, and that this can either be for intentional or unintentional reasons. Considering the negative consequences that an inaccurate eyewitness' response may have for a legal case, it is imperative that efforts are taken to reduce the likelihood of inaccuracy in response to a question. A confident response is not necessarily an accurate response, although those who make a response confidently are often said to have responded accurately (Bornstein & Zickafoose, 1999; Sutherland et al, 1996). However there are mixed findings concerning the relationship between confidence and accuracy; some studies show a degree of positive correlation (r = +.0.44, Lipton, 1977), while others show no relationship; and yet other studies reveal a positive relationship between confidence and accuracy where people appear more confident when their response is incorrect (see Loftus, 1979 p 100-102 for a review). The reason for these mixed findings may lie in the design of the experiments. Traditional laboratory experiments where there is usually a high degree of experimental control seem to suggest a stronger relationship between confident and accurate responses. However those more applied experiments simulating real eyewitness situations show a weaker relationship between

confidence and accuracy (Wells et al 1983). Bothwell, Deffenbacher, and Brigham, (1987b) suggested that the differences in encoding conditions could account for the different findings between studies; the better the encoding conditions the better the relationship between confidence and accuracy. These findings raise concern as the conclusions reached from laboratory studies may influence jurors to hold the common misconception that confidence equals accuracy. Of concern also is that the findings from applied experiments suggest a weaker relationship between confidence and accuracy and confirm that in real situations there are many factors that can influence a witness' confidence, and their accuracy, and the relationship between confidence and accuracy.

As there is a distinct lack of eyewitness literature assessing children's confidence accuracy (CA) relationship, the direction for investigating this topic originates from the adult literature addressing the topic. Much of the work with adults investigates the CA relationship when participants are required to identify a perpetrator from a line-up or from photographs. Requests of this nature usually take place with authorities such as the police and thereby involve questioning regarding the person's confidence in their own answers. There are many factors that can affect the CA relationship. In their experiment Bradfield, Wells and Olson (2002) found that feedback provided by a line-up administrator affected eyewitnesses responses. Confirming feedback inflated certainty in inaccurate

responses more than it did in accurate responses; the CA relationship was therefore significantly reduced (r = 0.37) in comparison to a control condition where no feedback was provided (r = 0.58). Similarly when an eyewitness makes an identification that confirms obvious beliefs of either an administrator or a jury, confidence in the eyewitnesses' own response is malleable; eyewitnesses became more confident in their answers if their identifications confirm the beliefs of the authority figure (Garrioch & Brimacombe, 2001). There is also a vast amount of evidence from the face recognition literature which suggests that the confident identifications of faces are not always reliable (Wright & Stroud, 1998).

Assessing confidence can be a difficult task. Much of the work that has been carried out investigating adult's confidence involves adults completing questionnaires or verbally reporting their confidence after providing their recall. Both of these methods involve participants having the ability to reflect and to interpret their metamemory. I felt that this task combined with the act of remembering and reporting, and in some cases drawing, may enforce a cognitive load beyond the capabilities of the children involved in my experiments and would not therefore provide a true reflection of children's ability to report confidence in their answers

An extensive literature review revealed that there is currently no appropriate method of assessing children's confidence. Accordingly, for this thesis I devised a novel confidence scale, and

used it to assess children's confidence and also to allow children to report that they were not confident in a response with a physical indicator to reduce any social pressure or high linguistic demands that a child may feel when required to admit that they do not know the answer to a question.

Assessing children's confidence in their own response will enable greater insight into their memory capabilities. If children frequently provide an incorrect response with associated high confidence it could be assumed that when children respond inaccurately they are doing so because they truly believe that their answers are correct. However if children provide an incorrect response with associated low confidence this may indicate that at some level they know they are reporting incorrectly and are doing so for another reason than lack of accurate memory. It is important to be able to distinguish between these two types of error.

A further reason to assess children's confidence is because children are often reluctant to admit that they do not know the answer to a question and will guess inaccurately to avoid the 'don't know' response (Robinson & Briggs, 1997). With the confidence scale the option to report a 'don't know' response is provided at every stage of the interview process. The social constraints that a child may feel when required to admit that they do not know the answer may be reduced, as the confidence scale in this thesis provides children with the option to indicate that they do not know the answer to a question with a physical indication. When the

confidence scale has been extensively tested it will provide an opportunity to decipher more accurately whether the child is responding inaccurately because they do not know the answer to a question or because they actually have inaccurate memory. I felt it appropriate and useful for many areas of studying children's abilities to devise an age appropriate confidence scale.

11.2 The Confidence Scale

11.2.1 Materials

Three children's building blocks of varying sizes were used in the confidence scale. They represented high, middle and low confidence. For the training stage six A4 sized laminated picture sets from different starting points (5 years, 7 years and 14 years) from the BPVS were used.

11.2.2 Training and the use of the confidence scale

In three of the experiments included in this thesis children's confidence in their own answers to direct questioning during the interview was assessed. Children were trained in small groups of between six and eight in the use of the confidence scale following the presentation of PEI, and just prior to their individual interviews.

The experimenter explained to the children that they would play a game but first they had to learn the meanings of three blocks. The children were told that when they were asked a question they should think about the answer and then pick up one of the blocks. If the child thought that they were definitely sure that

they remembered the answer to a question then they should pick up the largest of the blocks. If they thought their answer was correct but they were not quite sure then they should pick up the middle block, and finally if they couldn't remember the answer then they should pick up the smallest block.

The experimenter then explained to the children that she would ask herself some questions and pick up the block that indicated her own confidence in her response. The questions were "Do I know my name?" for which she picked up the largest block to indicate that she had high confidence in her memory for the response; "Do I know all of your names?" for which she chose the middle sized block to indicate that she thought that she knew the answer but was not quite sure; and "Do I know who one of the children in the groups friend is?" for which she chose the smallest block to indicate that she did not know the answer to that question.

In turns the children were asked one question and were required to pick up the relevant block to indicate their confidence in their answer. The questions were designed to elicit different confidence responses (for example "Do you know what your teachers name is?" for high confidence, "Do you know what colour my car is?" for low confidence).

Following this the children were given one of a series of six laminated picture sets from the BPVS. The picture sets were of varying difficulty as they were taken from the starting point for either five, seven or fourteen year olds. Children were told that the

experimenter would give them a word and the children should think about whether they knew which picture portrayed that word. It was emphasised that it did not matter whether the children responded with the correct answer, and that the most important thing was that they picked up the block to show the experimenter whether they knew the answer or not.

This training continued until it appeared that all of the children understood the meanings of the confidence scale blocks, as they responded with the aid of the confidence blocks that represented their confidence in their response. Children then returned to their classrooms. The children were then individually interviewed in all three of the experiments that used the confidence scale in this thesis (experiments 2,3, and 5). The interviews involved a free recall prompt followed by a series of direct questioning. Before the direct questioning stage the children were asked if they remembered what the three different blocks meant. If the children reported that they did not remember the meanings of the blocks time was spent re-explaining their meanings, although this only occurred on three occasions throughout all three studies. The children were then instructed that they would be asked a series of questions and that they should think about how well they knew the answer to the questions and choose the relevant block before providing an answer. The experimenter recorded the children's confidence response in correspondence with each of the direct questions.

11.3 Results

The data obtained from the inclusion of the confidence scale in experiments 2, 3 and 5 are included here. Firstly experiments 3 and 5 will be presented. Experiment 2 is presented lastly as the coding of the irrelevant questions involves a "don't know" response being the correct response, and therefore breaks the pattern of the other experiments.

11.3.1 Experiment 3

The following analysis provides a clear indication of the value of the confidence scale by extracting the relevant data from the experiments that made use of the confidence scale within this thesis. Combining the data to form an overall correlation value for the relationship between confidence and accuracy was considered but this was impractical considering that each of the experiments were designed differently and involved structurally different questioning.

In experiment 3 (n = 78) the children took part in an interactive event with Mrs. Flour. The confidence scale was used primarily to allow children to report that they did not know the answer to a question by reducing the stigma that they may otherwise feel. The data can also be used to provide an indication of children's own knowledge of their memory. Table 6 represents the total amount of correct, incorrect and don't know responses made by the children and the total amount of high, middle and low

confidence indicators that accompanied the responses. It is clear that most of the high confidence responses (89%) were elicited when a child responded correctly and that most of the low confidence responses (95%). were elicited when a child did not know the answer to a question. The middle confidence responses were evenly distributed between correct and incorrect responses.

	High	Middle	Low
Correct	469 89%	19 46%	1 1%
Incorrect	58 11%	21 52%	2 4%
Don't know	0 0%	1 2%	53 95%
Total	**527**	**41**	**56**

Table 6. The distribution of the total amount of responses and the corresponding distribution of the total amount of confidence responses.

The main interest is in the relationship between the high confidence responses and the correct answers and the relationship between the low confidence responses and the don't know responses. Figure 13 clearly illustrates that when children responded

to a question with a 'don't know' response this was highly likely to be accompanied by the low confidence indicator ($r = 0.94$, $p<0.01$).

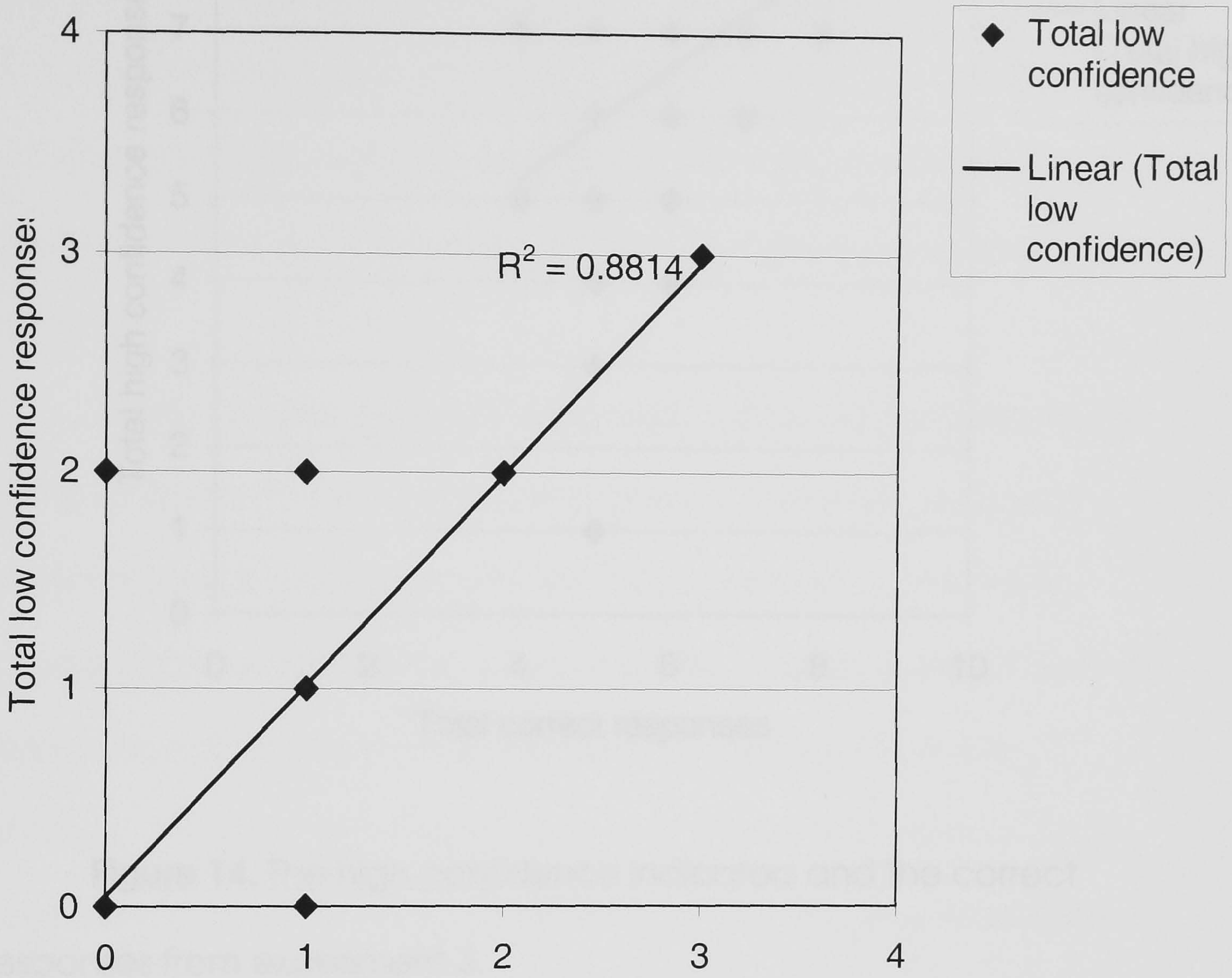

Figure 13. Low confidence indicators and don't know responses in experiment 3

Figure 14 demonstrates the relationship between the children's correct responses and the high confidence indicator. These two measures were highly correlated ($r = 0.51$, $p < 0.01$) indicating that when children respond with the correct answer they are likely to feel confident that it is the correct answer.

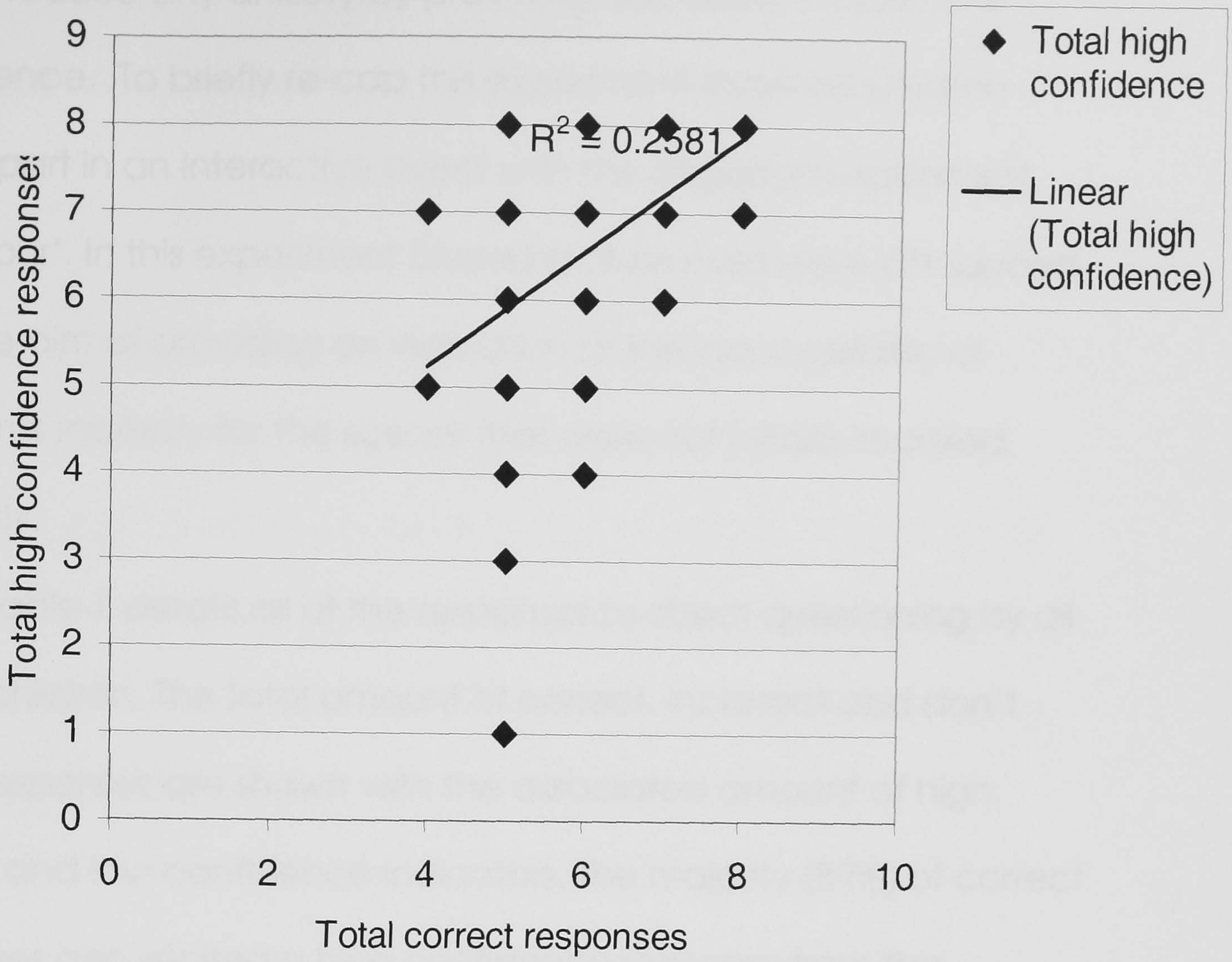

Figure 14. The high confidence indicators and the correct responses from experiment 3.

Due to the small number of responses, the middle confidence indicator was not analysed further. The amount of incorrect responses in experiment 3 was distributed relatively equally over the three levels of confidence indicators, although most (48%) were accompanied by a middle confidence indicator.

11.3.2 Experiment 5

In the fifth experiment (n = 48) included in this thesis the confidence scale was used. The main purpose again being to allow children to realise that a 'don't know' response was a viable option,

and to reduce any anxiety by providing a physical indicator of confidence. To briefly re-cap this experiment involved children taking part in an interactive event with the disguised experiment 'Mrs. Flour'. In this experiment blurred picture cues were introduced with the aim of providing an indication of the inaccessibility of children's memory for the scenes that were not initially recalled correctly.

Table 7 details all of the responses to direct questioning by all of the children. The total amount of correct, incorrect and don't know responses are shown with the associated amount of high, middle and low confidence indicators. The majority (89%) of correct responses also elicited a high confidence response from the children. The majority of don't know responses (84%) elicited a low confidence response from the children, and in this experiment the majority of incorrect responses (70%) elicited a middle confidence response.

	High	Middle	Low
Correct	269 89%	11 28%	7 18%
Incorrect	26 9%	28 70%	0
Don't know	6 2%	1 2%	36 84%
Total	**301**	**40**	**43**

Table 7. The total amount of correct, incorrect and don't know responses to direct questioning with associated confidence indicator.

Fig 15 records the number of correct responses in this experiment and the corresponding number of high confidence indicators. High confidence was highly correlated with correct responses ($r = 0.68$, $p < 0.01$). This suggests that children understood the confidence scale and used it mainly when they believed that their answers were correct.

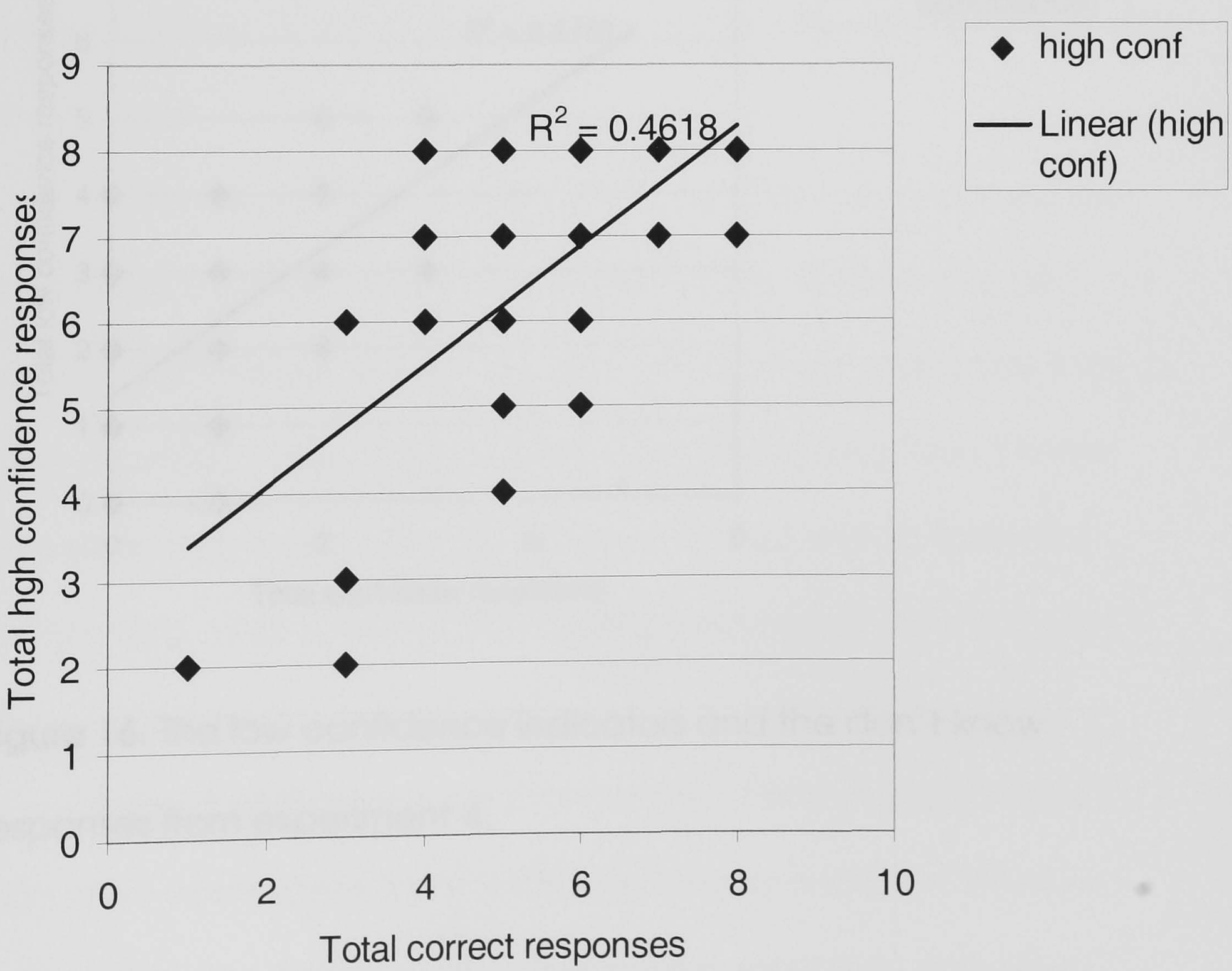

Figure 15. The high confidence indicators and the correct responses from experiment 4.

Fig 16 reports the amount of 'don't know' responses and the corresponding amount of 'low' confidence responses. Again these were highly correlated with each other ($r = 0.72$, $p < 0.01$), suggesting that children could report accurately that they did not know the answer to a question with the aid of a 'low' confidence indicator.

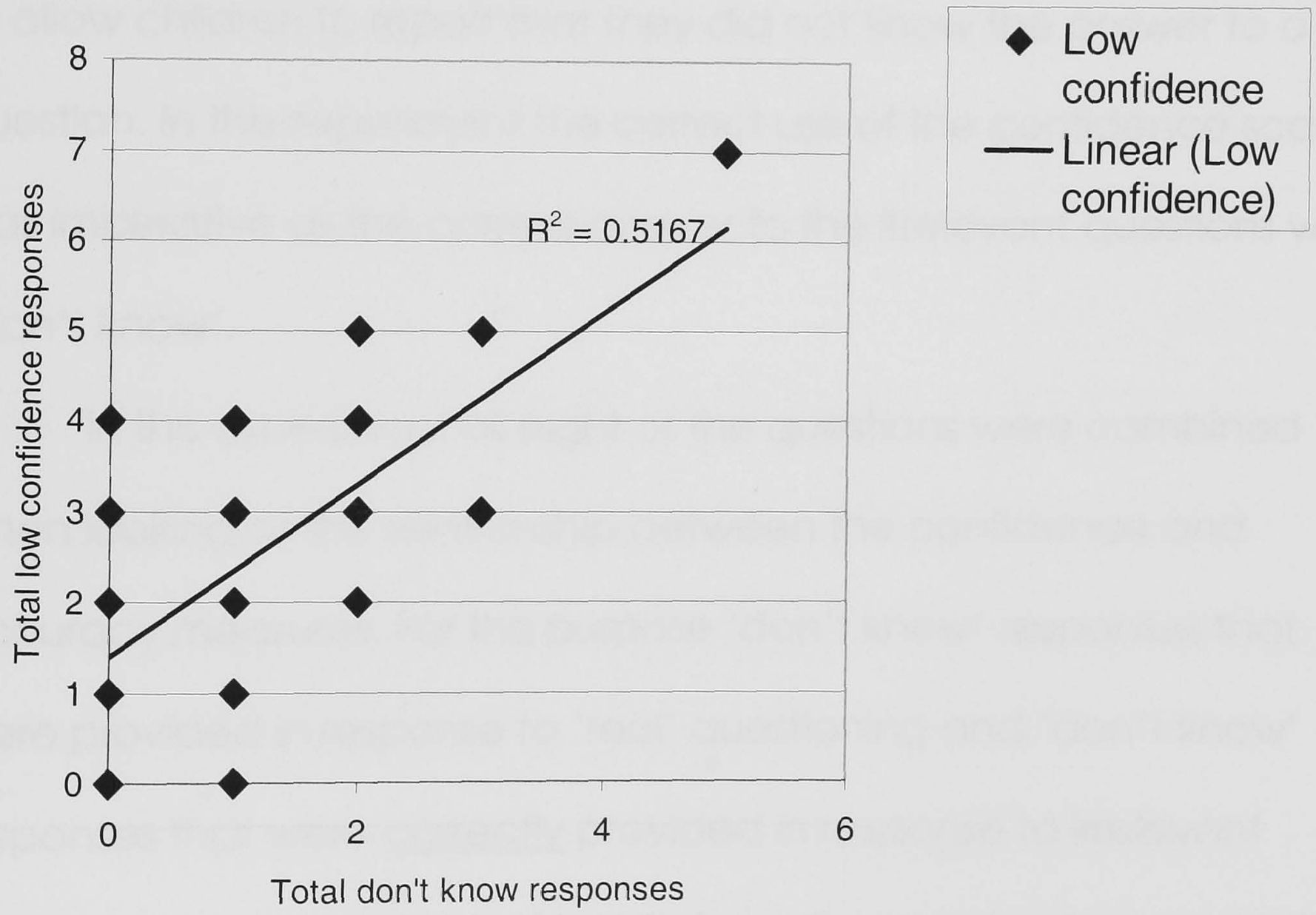

Figure 16. The low confidence indicators and the don't know responses from experiment 4.

Again the incorrect responses were distributed over the different confidence indicators, although most (66%) were

accompanied by a middle confidence indicator. As this was not the main interest it was not analysed any further.

11.3.3 Experiment 2

The final experiment to make use of the confidence scale was experiment 2 (n = 32) which involved children watching a video of the kidnap of a teddy and aimed to investigate the difference in responses by children who drew and verbalised their answers and children who verbalised only in response to irrelevant questioning. Again the main reason for the inclusion of the confidence scale was to allow children to report that they did not know the answer to a question. In this experiment the correct use of the confidence scale was imperative as the correct answer to the irrelevant questions was 'don't know'.

In this experiment all eight of the questions were combined when looking at the relationship between the confidence and accuracy measures. For this purpose 'don't know' responses that were provided in response to 'real' questioning and 'don't know' responses that were correctly provided in response to irrelevant questioning were combined to produce an overall value of 'don't know' responses.

Table 8 displays the total amount of correct, incorrect and don't know responses to the direct questions, and the confidence scale indicator chosen to accompany the response. Following the pattern of the previous two experiments, most of the high confidence responses (82%) were elicited when the response was

correct. Most of the low confidence responses (68%) were elicited when the child reported that they did not know the answer to a question. Finally the majority of incorrect responses (90%) were elicited when a child incorrectly to a question.

	High	Middle	Low
Correct	173 82%	2 10%	0
Incorrect	38 17%	19 90%	7 52%
Don't know	2 1%	0	15 68%
Total	**213**	**21**	**22**

Table 8. Displays the distribution of correct, incorrect and don't know responses and the associated reported confidence indicators.

Fig 17 reveals that the don't know responses were highly correlated with the low confidence indicator ($r = 0.96$, $p < 0.01$) independent of the nature of the questioning (real or irrelevant).

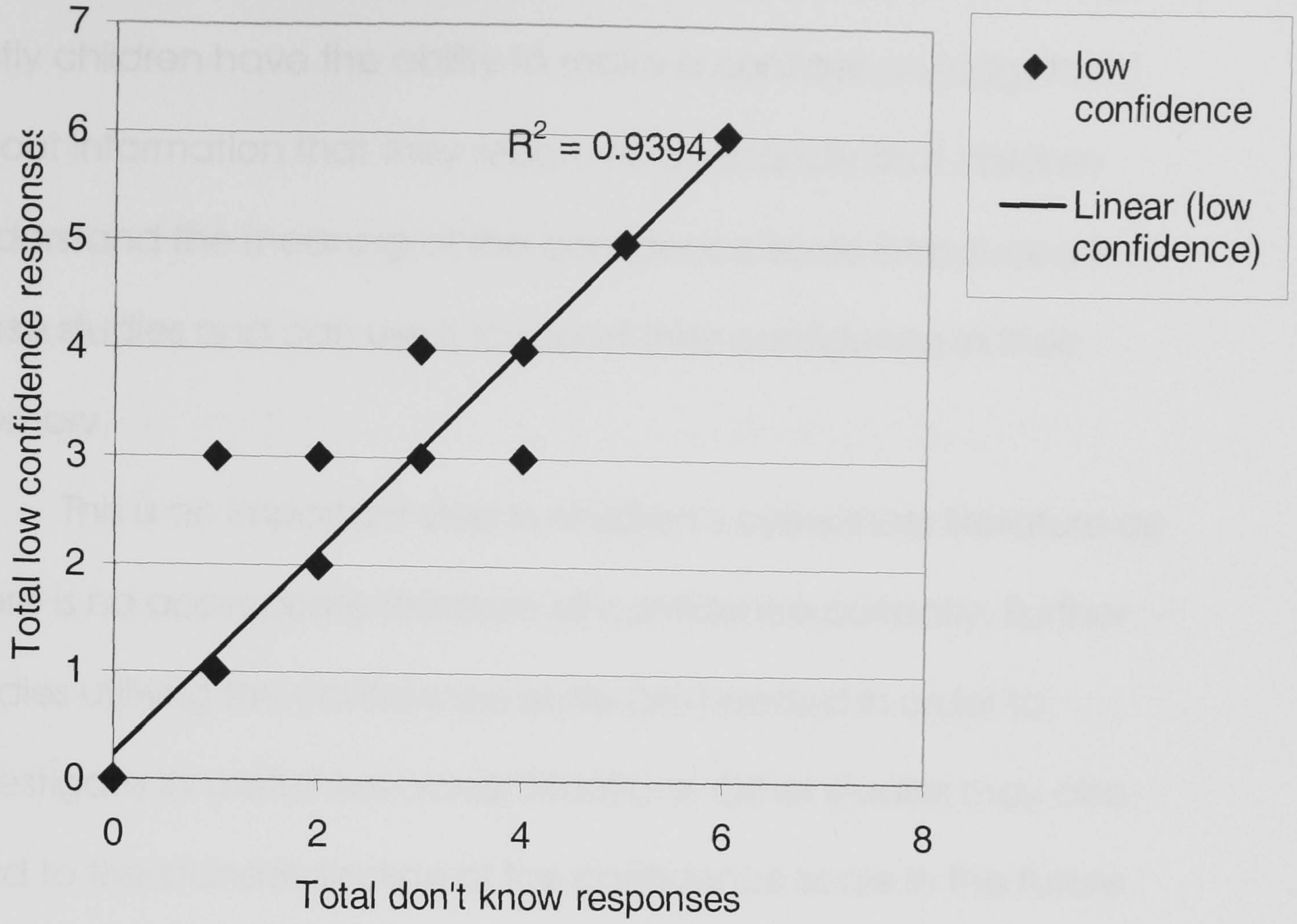

Figure 17. The low confidence indicators and the don't know responses (irrelevant of whether questioning is real or irrelevant) in experiment 2.

11.4 Conclusions

The confidence scale was well utilised by the children in all three of the studies (involving 158 children). There was a strong correlation between the accuracy of children's responses and the use of the confidence scale. When children responded with a correct answer it was likely to be accompanied by a high confidence indicator and when they responded with a don't know response it was likely to be accompanied by a low confidence

indicator. It is possible to conclude two things from these findings. Firstly children have the ability to make a confidence judgement about information that they report. And secondly that children understand the meaning of the confidence scale introduced in these studies and can use it to report their confidence in their memory.

This is an important step in children's eyewitness literature as there is no appropriate measure of confidence currently. Further studies utilising the confidence scale are needed in order to investigate its usefulness across situations. Other studies may also lead to the standardization of the confidence scale in the future that would benefit not only psychological research but may also lead to inclusion in interviews with child witnesses and therefore to increased accuracy of children's testimonies.

The confidence scale also has social benefits. Children are often reluctant to admit that they do not know the answer to a question and will often provide an incorrect response quite intentionally. The modality of the confidence scale in this thesis was of a physical nature and therefore reduced some of the social and linguistic pressure that a child may face when they are trying to let an interviewer know that they do not know the answer to a question.

In relation to the conflicting findings in the adult literature addressing the confidence and accuracy relationship these initial findings concur mostly with the laboratory studies suggesting that a

confident response is usually an accurate response. At this initial stage of the data collection on children's confidence it is only appropriate to make some tentative suggestions and observations. It may be that the innocence associated with childhood may make it easier to assess children's confidence than it is to assess adults' confidence. There may be many more reasons that adult's confidence and accuracy relationship is weaker in applied settings. Adults may be more aware of the consequences of making certain responses. For example an awareness of the judicial system may influence an adults confidence in their own memory for an event if they believe that their answer will directly affect the final verdict (Kapardis, 1997). The associated pressure of this may cause an adult to doubt himself or herself and therefore to decrease their own confidence. Children may not be aware of the judicial process, and so although they may feel nervous about the prospect of being in a court (Saywitz, 1993), they may be unaware of the consequences of their responses and therefore more likely to accurately report their confidence.

To summarise then, the confidence scale was an unexpected success throughout the research process. The data provides an opportunity to standardise and utilise this method as a way of improving the quality of information that could be provided by the child witness.

Chapter 6

General Discussion

12.1 Drawing During an Interview

In the review of the literature it was noted that studies that had concluded that drawing had facilitative effects on recall (and those that found no facilitative effect) had included questioning about a real event that had actually occurred. It is not possible to make strong conclusions about accuracy without also investigating responses to questions that are about events that have not occurred. In real life situations witnesses are not always questioned about incidents that have taken place, some of the questioning is about events that are only suspected. Investigative interviewers are not usually fully aware of the incident, which justifies their questioning, inevitably their questioning will probably include at the very least some irrelevant questions, and may even include misleading or aggressive questioning about things that did not occur.

Study 1 was included as a pilot study to provide an indication of the expected results when children draw during an interview and are required to respond to irrelevant questioning about an event. Initially this study was planned to produce enough data to be included as a separate study. However during the data collection stage it became apparent that there were some serious methodological issues which would have confounded any

conclusions made from the analysis. It should be noted however that the decision to terminate this experiment early and include it as a pilot study shows evidence of cost-effective research skills and of intelligent decision making. Parents identified two significant events that had occurred in their child's life and two significant events (from a list of eight) that had never occurred in their child's life. Children were then interviewed with or without the aid of drawing during the interview. Children were very accurate in responding to questioning about events that had taken place whether they drew in the interview or not. Contrary to our expectations children were also very accurate in responding to questioning about events that had never occurred regardless of whether they drew during the interview or not. This evidence could be used to support the view that drawing increases accuracy without increasing inaccuracies, however there are some outstanding methodological issues that may also be responsible for the current results.

In pilot study 1, the ages of the children were increased from five to six years to seven to eight years, the intention being to reduce the increased cognitive demand that is required to draw, remember and recall during an interview, and isolate the effects of drawing. There is a developmental trend in suggestibility that indicates that increases in children's accuracy may be due to a general age related increase in resistance to misleading or suggestive questioning. This could account for the lack of an effect in pilot study 1; children may have been old enough to resist the

irrelevant questions and it may be this that the experimental design isolates rather than the effects of irrelevant questioning on drawing.

The children in this study were all recruited from one school in Bristol. There are extreme differences in abilities in schools in Bristol and the school involved in this study was a particularly high achieving school, achieving average or above average results in the National Key-Stage 2 results, (DFEE, 2000). This may also account for children's strong resistance to questioning about events that never took place.

A further factor to consider is that the events that were included in this study were all different and were significant life events. Memories for these events may not be affected by irrelevant questioning; this in itself is a positive finding and may lead to restoration of faith in the child witness to recall events such as these accurately. If questioning was concerned with only one scripted event then children's memories may be more vulnerable to irrelevant questioning. Exp. 2 was designed to investigate these possibilities further.

In Exp. 2 the age group was reduced back to five to six year olds, and a different school was recruited that had lower and more common Key Stage 2 scores than the school in pilot study 1 In Exp. 2 questioning was only concerned with one event and included 'true' and 'irrelevant' questions. The original event was shown to children by videotape. The false questions were manipulated to be about things that had been hinted at during the original event, but not

explicitly stated. Children either drew or not during their verbal interviews.

The findings indicated that there were little differences in responses to the false questions. It was not that all children were particularly accurate, although accuracy was quite high, but that inaccuracies occurred regardless of whether the children drew in the interview or not. It is tempting to conclude at this point that there are little differences in children's recall when they draw during an interview and when they verbally recall only.

A number of researchers are committed to finding ways in which the accuracy of children's testimony can be improved. The data from the experiments in this thesis support the inclusion of drawing during interviews with children aged five to six years, and predict that the detail of children's recall will increase, accompanied by no increases in inaccuracies. This could make a major difference to the judicial system and also to the courts' general confidence in the abilities of the child witness. However there are a few outstanding issues that need to be clarified with further research before any final conclusions can be made.

There were only four questions included in Exp. 2 that were about things that had not occurred during the original event. These questions may not isolate any potential differences between drawing and not drawing during the interview. In other words if these questions were either more or less misleading, differences between drawing and verbalising and verbalising only may have

been found. It is recommended that more studies be carried out that focus on children's responses to irrelevant questioning when they draw during an interview.

Again caution must be mentioned. A recent study has investigated a similar research question concerning the effects of drawing during interviews. Bruck et al's (2000) study that included a comparison between children who had opportunity to draw true and false reminders before an interview (drawing as a rehearsal device), and those who did not draw the false reminders. The authors found that children who drew before the interview provided more correct and more incorrect recall than the children who did not draw. Their conclusions were opposite to the conclusions in my experiments as they emphasised the dangers of increasing inaccuracies when children draw during an interview. The method was different to pilot study 1 and Exp. 2 as they included drawing as a rehearsal device and not a recall aid during an interview. Further research is required to make direct comparisons between these two methods.

These two studies included in this thesis do not do justice to the gap identified in the literature on the effects on recall when children draw during an interview and respond to real and irrelevant questioning. There are a number of improvements that can be suggested to improve future studies re-addressing the issue. For example in the first pilot study the events that the children were questioned about were quite implausible and on reflection it is not

surprising that none of the children admitted to these dramatic life events occurring when they had not. It would be interesting to re-run this pilot maintaining the methodology of using parental questionnaire as this is an effective way of maintaining accuracy and experimental control but with questioning of a less spectacular nature.

The second improvement that should be considered in the future design of experiments is that the number of participants should be included to identify the subtle differences in recall performance, (this is especially true of the pilot study). Also the differences in the quality of schooling in Bristol were highlighted by the pilot study. This could be identified prior to the data collection stage if children's BPVS scores were obtained. Taking BPVS scores may also allow some interesting statistical analysis between the children's recall performance or drawing ability and their verbal ability scores (from the BPVS).

Lastly it would be interesting to monitor and to correlate the relationship between children's drawing ability and their recall ability. This could be achieved through independent ratters rating children's drawings as Butler et al did in their study (1995). They had 20 adults rate drawings for representational quality. There was a large range in quality that is indicative of the developmental differences in this age group (5-6 years). There was a positive relationship between drawing quality and amount recalled, and a significant correlation in the direct recall phase. Although the scope

of this thesis did not allow for a detailed investigation into this relationship it may be interesting to include this further variable in the future.

In Exp. 3 drawing was included during interviews with children mainly for exploratory purposes, because the literature reported mixed findings (Butler et al, 1995; Salmon & Pipe, 2000). During the interview stage children were split into one of two interview groups; a draw and verbalise condition or a verbalise only condition. Drawing during the interview led to increased accurate verbal recall in free recall compared to verbalising only. Whether children drew during the interview or did not draw did not affect their accuracy in the directed recall stage. This was a different result to Butler et al (1995), who found increased accuracy with drawing in the direct recall stage, this is most likely to do with the differences in coding between the studies.

The facilitative effect of drawing during the interview in free recall and the high accuracy during direct recall are encouraging findings. Children generally report little information during free recall, although it is usually accurate. Our data suggest that children who draw may provide increased detail in their free recall reports without increases in inaccuracies. There are many possible reasons for this. Firstly, by producing a drawing, children may be providing themselves with their own internal retrieval cue which may cue their memory for the event and increase the information that they remember and then report. Secondly the facilitative effect of

drawing could be due simply to the children spending longer in an interview when they draw, and staying on task for longer, with the consequence of increasing recall. Finally drawing could have facilitative effects on free recall because it makes the interview process more comfortable, makes the child feel more in control of the process and therefore increases their recall.

To summarise, pilot study 1 and Exps. 2 and 3 all investigated the usefulness of including drawing during interviews with children. Pilot study 1 and Exp. 2 were designed to address the effect of irrelevant questioning on children's recall when they draw. Pilot study 1 found all children to be accurate regardless of whether they drew during the interview or not in response to true and irrelevant questioning. This study had too many methodological issues for conclusions to be made at this stage. Exp. 2 re-addressed the same question with an improved design and found no differences between drawing and verbalising and verbalising only and children's accuracy when responding to true and false questions, supporting the use of drawing in interviews with five and six year old children. Although these findings can only ever be included as an indication of expected findings, due to methodological issues previously mentioned. Exp 3 found drawing increased free recall, but not directed recall.

12.2 The Omission Effect

The PEI literature is littered with the robust misinformation effect; where memories of an original event are inaccurate as a result of erroneous information presented after the event. The methodology of many of these experiments is similar; an event is shown, or staged, following this there is a PEI stage where some details of the original event are false, finally participants are questioned about their memory for the original event. New false memories of the original event can be implanted (Loftus & Pickrell, 1995; Roediger et al, 1996; Pezdek & Roe, 1997) and memories of the original event can be changed (Loftus et al, 1978; Pezdek & Roe, 1994; 1997) using this method. An eyewitness is required to relay memories of an event many times and the event in question is often replayed and discussed after the event. This leads to an eyewitness being particularly vulnerable to the misinformation effect and leads to yet another important consideration when assessing the accuracy of eyewitness recall.

Only a single study has previously investigated the possibility of making memories of an original event less accessible in children using PEI methodology. Pezdek and Roe (1997) were unsuccessful in their study and concluded that it was not possible to erase memories of an original event. I was particularly concerned with the methodology that Pezdek and Roe used. In the condition where they attempted to erase the memory of a touch that had occurred

during the original event, it was suggested to the children that they were not touched. The explicit suggestion that the touch had not occurred may have indirectly activated the children's memory of the touch and focused children's attention on that scene. Consequently the experiment is vulnerable to testing something completely different i.e. whether children will follow an experimenter's instructions to not report something rather than testing children's memory.

Three of the experiments included in this thesis have re-addressed the question of whether memories can be made less accessible using the PEI method. By improving the methodology my experiments have found that memories can be made less accessible by manipulating PEI and therefore filled this gap in the research. The experiments have resulted in a new finding that may advance our understanding of the child witness in both a theoretical and applied sense.

Exp. 3 and 4 involved children taking part in an interactive event, making the data applicable to eyewitness situations. In line with many experiments investigating children's abilities as witnesses, one of the target events was a touching event (handwashing). Some of the children were allocated to an 'omit' condition where a target scene was simply omitted from a PEI video review of the original event, and smoothly covered up with careful editing. The main question was whether the presentation of non-target scenes triggered the memory for the whole scripted event and therefore

increased the likelihood that the target scene be recalled, or whether the representation of the non-critical scenes would have an inhibitory effect and make the target memory less likely to be recalled? Children in the omit condition were less likely to recall the target scenes when directly questioned about them than children in a control condition where different information was presented during PEI. These two experiments support the idea that it is possible to make a memory of a scene from an original event less likely to be reported when it is omitted and covered up during PEI.

This finding supports a coexistence model of memory rather than a single trace model. The activation-spread model (Ayers & Reder, 1998) can explain how the manipulations in these experiments can alter memory. During the original event memory concepts are formed for each of the scenes and connections between them will be formed (for a re-cap on the activation model please see Figure 4). At this point all concepts and connections between them are equally activated. During PEI the concepts of the scenes that are repeated and the connections between them will be further positively activated and this will increase the likelihood of them being reported during an interview. The concepts and connections to the target scenes that are omitted and covered up are not activated (or inhibited) and therefore less likely to be recalled.

It is possible to explain why this inhibitory effect occurs by encompassing Michael Anderson's work on retrieval induced

forgetting. His experiments involve giving participants lists of categorized words and then asking them to retrieve some of them from some of the categories. In a memory test participants were given category names and were required to retrieve the words. Performance was impaired for words that were not retrieved previously, but belonged to a category where words had been previously retrieved. He concluded that the activation of related words can result in retrieval inhibition of target words (Anderson et al, 1994). In later experiments this finding was successfully extended to the retrieval of pictures (Shaw et al, 1995).

Following this argument and in relation to the omission findings in my experiment, it could be assumed that the activation of non-critical scenes leads to the direct inhibition of the target scenes and that they are consequently less likely to be recalled.

The findings in Exp. 3 and 4 are important, not only because they are new findings, but also because they have extensive theoretical and practical relevance for the eyewitness. Theoretically the data can help us to understand more about memory processes. In terms of application, our understanding of the eyewitness can increase and it may be possible to predict what children are likely not to recall in eyewitness interviews. Consider the following example; a child victim of abuse has no conceptual understanding of what is happening to her, the abuse is never discussed but events surrounding the event may well be. Our data can go some way to explaining why this child may not report abuse when questioned

about it. The findings in these experiments can also be tentatively applied to the false memory creation debate, where adults report memories of child abuse, normally in a therapeutic setting. If it is assumed that these abusive events occurred, were never discussed and were effectively covered up during childhood, then the reactivation of these memories may require the use of methods as strong as the ones used in therapy (e.g. dream work / hypnosis) to induce their recall.

In Exp. 5 the modality of the event was changed to encourage the children to form third party memories. The original event followed the same script as that of Exp. 3 and 4 (the Mrs. Flour story) but was originally presented to the children in video form, the PEI was a story accompanied by still pictures shown to the children via a laptop computer. Although the effects were in the expected directions; children who watched the video with the target scene missing were less likely to recall that scene when questioned directly about it than children in the control group, there were no significant differences. The omit group were not more accurate in this study, compared to the omit groups in Exp. 3 and Exp. 4, in responding to the target questions relating to the target scenes. The lack of differences seemed to be due to the control group being more inaccurate when responding to the target direct questions in this study than the control groups in Exp. 3 and Exp. 4.

The lack of replication of a significant omission effect in this experiment could be due to two reasons. Firstly the time of

encoding of the original event during Exp. 3 and 4 was about twenty minutes, the assumption being that this information is well encoded. The original event in Exp. 5 was shown to the children on a videotape and lasted about seven minutes. It may be that memories are only vulnerable to the omission effect when they are well encoded. This would also explain why the control group's performance was different between the first two experiments and Exp. 5. The control group may be less accurate in Exp. 5 because memories of the original event were not initially well encoded due to the shorter duration at the presentation stage (Frost & Weaver, 1997). The original event was not interactive and this may have also have influenced the results. It may be that the omission effect only affects memories that have been developed from an interactive original event. These memories are usually personally relevant and it has been shown that children's are usually accurate when they are recalling information from events of this nature (Goodman et al, 1990)..

Secondly, in Exp. 3 and Exp. 4 children took part in the original event, they formed personal memories, and recalled information using first person pronouns. In Exp. 5 the original event followed the same script as Exp. 3 and Exp. 4, but it was shown to the children via videotape, encouraging children to form third party memories and recall information about someone else's experience. Children are still acquiring the ability not develop the ability to see the world from another person's perspective during the period when they are

aged six to seven years (Saywitz, 1995). This undeveloped skill may account for children's reduced recall in Exp. 5. In conclusion it may be that only events that are personally experienced are vulnerable to the omission effect. Further research would clarify this point.

There are also numerous methodological issues that deserve mention and should be taken into consideration in the design of future experiments of this nature. Firstly, Mrs. Flour and the interviewer were the same person. Although this did not appear to influence the results in any of the experiments that included the story of Mrs. Flour, as the children did not mention the connection, we cannot be entirely sure. A more compact experimental design would be to include another person to take the part of Mrs. Flour, or to explicitly ask the children about the connection between the experimenter and Mrs. Flour at the end of the interview.

Also worthy of mention is the oversight that the children were aware that the experimenter has watched the PEI videos with the children and therefore had prior knowledge of the event before the interview commenced. Further studies should ensure that the children are fully aware that the experimenter does not have prior knowledge of the event in question, although this factor did not seem to affect the results adversely.

Secondly the questions that the children were asked in the experiments involving Mrs. Flour can be criticized. For example for some of the questions more than one response could be considered correct. Although this may be more realistic and allow

the results to be applied to the data more appropriately, the experimental control could be increased in future experiments by improving the structure of the questioning during interviews.

The data in Exp. 5 also reveals that children in the control group are aided by picture cues, particularly by the recognition cue (65%). So, as the control group does not benefit from any repetition during PEI, the information that they recall must be encoded from the original event. This further supports the accessibility theory, as when a memory is strongly re-activated by a recognition cue it is likely to be recalled. It would be interesting to investigate this further and isolate the effect of encoding on the likelihood of producing the omission effect.

12.2.1 Cues

In Exp. 3 the interview conditions were manipulated to include a condition in which the children drew during the interview. There is currently much debate about the effects of drawing during an interview in the literature and so it was included in Exp. 3 mainly for exploratory purposes. In response to a free recall prompt children reported more information when they drew and verbalised during an interview than when they verbalised only. This was different to Butler et al's (1995) study where they found no differences between drawing and verbalising and verbalising only in free recall, but increases in recall for drawers in response to direct questioning. In Exp. 3 there were no differences between the two interview conditions in directed recall, and all children were very

accurate. This was mostly due to the coding differences in the two experiments. Drawing during the interview did not affect the likelihood of children being vulnerable to the effects of omitting information during PEI.

As a result of the strong effect of omission in Exp. 3, Exp. 4 was not only designed to replicate this effect but also to assess the depth of the inaccessibility of the omitted information. The literature indicates that including real object cues during an interview is an effective way to encourage recall (Salmon et al, 1995). When children responded incorrectly to a direct question, the interview included two stages where a contextually relevant object cue was shown to the children and they had opportunity to respond to the question again.

Target responses that were initially incorrect were accurately recalled more often by the omit group than by the control group with the aid of either one or two object cues. This implies that children in the control group who did not benefit from any repetition of original information during PEI had either forgotten the information, or that it was more inaccessible than the omit group's memory for the target scene. Optimistically, memories that had been inhibited by the effects of omission were not forgotten and the presence of contextual object cues were sufficient to re-activate the memory for the target scene and increase its recall. In terms of application this indicates that memories that are not reported due to the effects of omission may subsequently be

recalled with the aid of relatively simple retrieval cues analogous to that of an object cue.

Exp. 5 also addressed the question about the depth of the inaccessibility of target memories caused by their omission during PEI by including two phases in the interview where blurred and full focus recognition picture cues were shown to the children. Children in the omit group were aided more by the inclusion of blurred picture clues than children in the control group, and recalled the target more often, although this was not a strong effect. Both the control and omit groups relied heavily on the full focus recognition picture clue to recall the target. As expected the control group remained inaccurate more often than the omit group.

Because of the lack of replication and the high amount of inaccurate responses from both the control and the omit groups, it is appropriate only to make speculative conclusions regarding the inclusion of blurred picture cues as aids to re-activating memories affected by the omission effect. The data from Exp. 5 suggest that blurred picture cues have the potential to be effective recall aids when memories are not initially recalled whether or not the lack of initial memory is due to the omission effect. Theoretically, these data further supports my previous conclusions; that memories are not forgotten but that their accessibility is affected by PEI, (this is also line with Frost and Weaver, 1997). It is important to note however that in application terms the presence of blurred picture cues in an interview would not normally be available and therefore this

method may be useful only in laboratory type experiments. Although their potential importance in eyewitness cases should be noted when considering evidence presented via CCTV tape or snapshots that can often be of poor quality.

Although the cues in experiments 4 and 5 are included as a way of looking into the omission effects a little more cognitively, their application in the real world is limited. In eyewitness interviews cues from the original event may not necessarily exist rendering it difficult to utilise the potentially positive effects of providing cues. It would be interesting and useful to use an innovative method of investigating the strength of the omission effect.

12.2.2 Future directions

Exps. 3, 4 and 5 showed that it is possible to make memories of a scene within an event less accessible when only that scene is omitted and covered up in a PEI review of the original event. This is a new and exciting finding and opens up a whole new area for research investigating the abilities of the child witness. Although Exps. 4 and 5 have gone some way in identifying the inaccessibility of memories affected by the omission of information, this question still needs further investigation.

My intention for future work is to include a further condition in the PEI stage that has a target scene omitted, but where it is not covered up and is instead replaced by noise for the amount of time that it would normally run. Comparisons between a condition such as this and the standard omit and control conditions should lead to

more evidence regarding the strength of encoding and the strength of inaccessibility of the memory. If the target memory is recalled more often in the noise condition than in the omit condition then it would appear that an interruption in the script is sufficient to activate the memory for the target scene, and that it is not necessarily the omission of the scene but the cover up that is effective in making the memories less accessible in the omit condition. If however there are little differences in the recall of the target scene between the omit and the noise group then it may be possible to conclude that it is in fact the omission of information that is crucial to the omission effect per se.

Another interesting manipulation would be to investigate the influence of instructing children to attend to the gap in a script (where the omitted information should be), thereby prizing apart the effects of omission from the effects of a cover-up even further. These experiments are being designed presently.

Efforts were taken to minimize the effects of a delay between the children being interviewed by having small groups of children participating in the experiments. The possibility exists however that children who have a smaller delay between viewing the PEI and being interviewed are likely to report the information from PEI more than those children who have a longer delay before being interviewed. Further studies should take the delay between PEI and interview into account when analysing the data and a series of

studies should be designed manipulating the length of the delay to fully investigate the omission effect.

12.3 Confidence

A further strand to the experimental work presented here is the confidence scale that is included in Exps. 2, 3, and 5. This was included primarily to encourage children to report that they did not know an answer to a question, when this was the case, as the literature indicates that children can be reluctant to do this. Apart from a self-reported questionnaire used with adults to assess confidence I could not locate an appropriate way to measure children's confidence. Therefore an age appropriate confidence scale was designed and implemented in these experiments.

Correct responses to direct questions were highly correlated with the high confidence indicator in all four of the experiments and don't know responses were highly correlated with the low confidence indicator. These strong correlations suggest that the confidence scale was well understood by the children. These findings are encouraging, and may result in reducing inaccurate recall elicited from children by helping them to report that they do not know the answer instead of guessing wrongly due their perceived pressure from an interviewer. The confidence scale should be extensively tested and standardised in the future.

12.4 Summary

To summarise the experiments contained in this thesis were designed to investigate two research questions:

1) Is it possible to make memories of an event less accessible?
2) Is drawing during an interview an effective recall aid for children's recall?

Pilot experiment 1 and experiment 2 addressed the first question regarding the effects of irrelevant questioning on the accuracy of recall when children draw during the interview. The results provided an indication that drawing during the interview does not increase the likelihood that children will respond inaccurately to irrelevant questioning. The results are however an indication as there were too many methodological issues and the sample sizes rendered the statistical analysis subjective in nature. In Exp. 3 the inclusion of drawing during an interview increased children's accuracy and detail in free recall

Exps. 3, 4, and 5 addressed the second question and found that it is possible to make memories less accessible using a PEI methodology where omitted information is shown. In Exps 3 and 4, it was possible to re-activate those inaccessible memories suggesting that they were not completely forgotten, but had been rendered inaccessible by the effects of omission.

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Video.

α Fun with ABC (1997), (Available from Carlton Home Entertainment limited),

Appendix 1

Anatomically detailed Dolls

Anatomically detailed dolls are widely used in clinical settings with children as a means of communication, the belief being that they remove conversational and social constraints (Yates & Terr, 1988). There has been very little empirical investigation about the use of anatomically detailed dolls, (Deloache, 1995). Child sexual abuse is more predominant in preschoolers (Ceci & Bruck, 1993), and in cases where sexual abuse is suspected anatomically detailed dolls are readily introduced. Research has shown that children who have been sexually abused and children who have not been sexually abused often demonstrate the same play activities with anatomically detailed dolls (Mc Iver, Wakefield & Underwager, 1989). Dolls with unusual orifices and features encourage the natural curiosity of children to explore the unusual body parts. Adults may erroneously interpret this behaviour, often termed 'sexual behaviour', as evidence of abuse.

However when children's play is defined as either sexual or non-sexual many researchers have concluded that anatomically detailed dolls are not overly suggestive to young children who are sexually naïve. In a study involving 2-8 year old non-abused children, Cohn (1991) concluded that children were often not interested in the dolls and that although some children inspected the genitals they were not either fascinated or repulsed by them. Goodman

and Aman (1990) reached a similar conclusion in their study involving 3-5 year old children. They had children interact in a play session with a male experimenter, later they were interviewed by a female experimenter either with or without dolls. Other than an overall developmental trend making the 5-year-olds more accurate and detailed there were little differences in the sexual content of their elicited recall. The use of dolls did not increase the number of incorrect answers, and children were no more likely to answer misleading questions about abuse incorrectly.

Caution must be taken here though, as the interview conditions in this study are far removed from that of an interview involving a non-abused child who is being questioned about suspected abuse. In these circumstances the questioning may be more aggressive, the environment cold and hostile and the adult interviewer may have an outcome in mind which guides the child to make false allegations. For example in the Kelly Michael's case anatomically detailed dolls were introduced in some of the interviews with the children. After repeated instructions to the children to speculate on how a spoon could be used to insert into the genitalia and buttocks, the doll was named Kelly by the interviewer. This blatant pressure on the child is staggering, but similar techniques were also used in the Wee Care case. Children were asked sexually suggestive questions and coerced by the interviewer into testifying to abusive incidents. Remarkably, children rarely made accusations of abuse and when they did it was usually

a one-word response to suggestive and leading questioning (Bruck & Ceci, 1995).

One of the underlying and most dangerous assumptions is that when a doll is introduced to a child the child will automatically come to view the doll's body as a representation of their own. Judy DeLoache has conducted much research into children's representations and recently has focussed on the use of dolls in an eyewitness interview context. In her study children played a game with an experimenter during which touching occurred, they were later questioned (DeLoache & Marzolf, 1995). The anatomically detailed doll was introduced by the interviewer who suggested, 'Lets pretend that this doll is you'. The child was asked whether the experimenter had touched them and encouraged to show on the doll where they were touched. The results indicated that young children have difficulty in using the doll as a representation of themselves. The children also produced less accurate recall about touching when using the doll than when they reporting verbally. DeLoache & Marzolf (1995) also noted that children did not spontaneously use the dolls to support their verbal recall. In combination this evidence is concerning as in many clinical settings the avoidance of interacting with an anatomically detailed doll is taken as evidence suggestive of abuse.

Appendix 2

Questioning and the Cognitive Interview

Questions can be termed direct, open ended or forced choice. Consistently children and adults are more accurate when questioned with open-ended questions and they make more inaccurate statements when they are questioned directly. Closed questions require a one word answer, usually yes or no and are often used in the courtroom. Cassidy and Deloache (1995) investigated the effects of the type of questioning on 4-5 year olds memory for an event. They showed 4 and 5 year old children two events, a puppet show and a play. Questioning took place over four sessions. In one group children were asked a free recall question followed by a series of direct questions. In another group the direct questions were proceeded by the answer to the question to control for rehearsal effects, although this is not very realistic and it could be argued that this is not memory at all. However the results indicated that adults questioning enhances the recall of young children for specific information about which questions have already been asked, but there are no generalised effects on memory performance or development.

Poole and White (1991) investigated the effects of questioning and compared children and adults recall performance. Children and adults were interviewed immediately and after 1 week, or only once after 1 week. Children were as accurate as

adults when responding to open ended questions. Children aged 4 years were more likely to change their answers to yes and no questions. Adults were more speculative than children when answering questions about something they knew nothing about. In a further study comparing open and focussed questioning children were more detailed and accurate in response to open ended questioning (Roberts, Zale, Sirrine, Marein-Etron & Punne, 1999). In this study children were provided inaccurate information to focussed questioning, although the authors were justifiably concerned that this type of questioning is more common in real life.

The cognitive interview was introduced and modified by Fisher and Geliselman (1992), with the aim of improving the training of police interviewers, who up until this time received little or no training in interview techniques. The modifications are influenced mainly by the criticism that the original cognitive interview was limiting due to its assuming ideal by basing research in more realistic settings. The principles of the cognitive interview fall into two categories that focus on memory and cognition, and on social dynamics and communication between the interviewer and the eyewitness. The relevance of including only a brief description of the cognitive interview is because the simulated interviews contained in the experimental work makes use of some of the recommendations made in the cognitive interview.

Studies comparing recall elicited by children in response to interviews conducted by trained cognitive interviewers and

interviewers not trained reveal that the cognitive interview could have beneficial effects on the accuracy and detail of children's recall. The revised cognitive interview produced even more impressive results with children. In a study comparing professional interviewers, research assistant interviewers and interviewers trained in the use of the cognitive interview, children interviewed by an interviewer using the cognitive interview protocol elicited over 65% more correct recall than the other two interviewer types (McCauley & Fisher, 1992; described in Fisher & McCauley, 1995). Disturbingly there were very few differences in the recall elicited from children who were interviewed by research assistants or by professional interviewers.

Other studies have revealed no such facilitative effect with the cognitive interview. A meta-analysis of 42 studies investigating the effectiveness of the cognitive interview with both children and adults was carried out recently (Kohnken, Milne, Memon & Bull, 1999). Although there was an increase in the amount of information when the cognitive interview was used, the overall accuracy rates (taking into account the proportion of correct details relative to the amount of incorrect details) were almost identical for the cognitive interviews and standard interviews. The authors also noted that the increase in the amount of correct details was more pronounced when the study had used a staged event and when the participants interacted in the event.

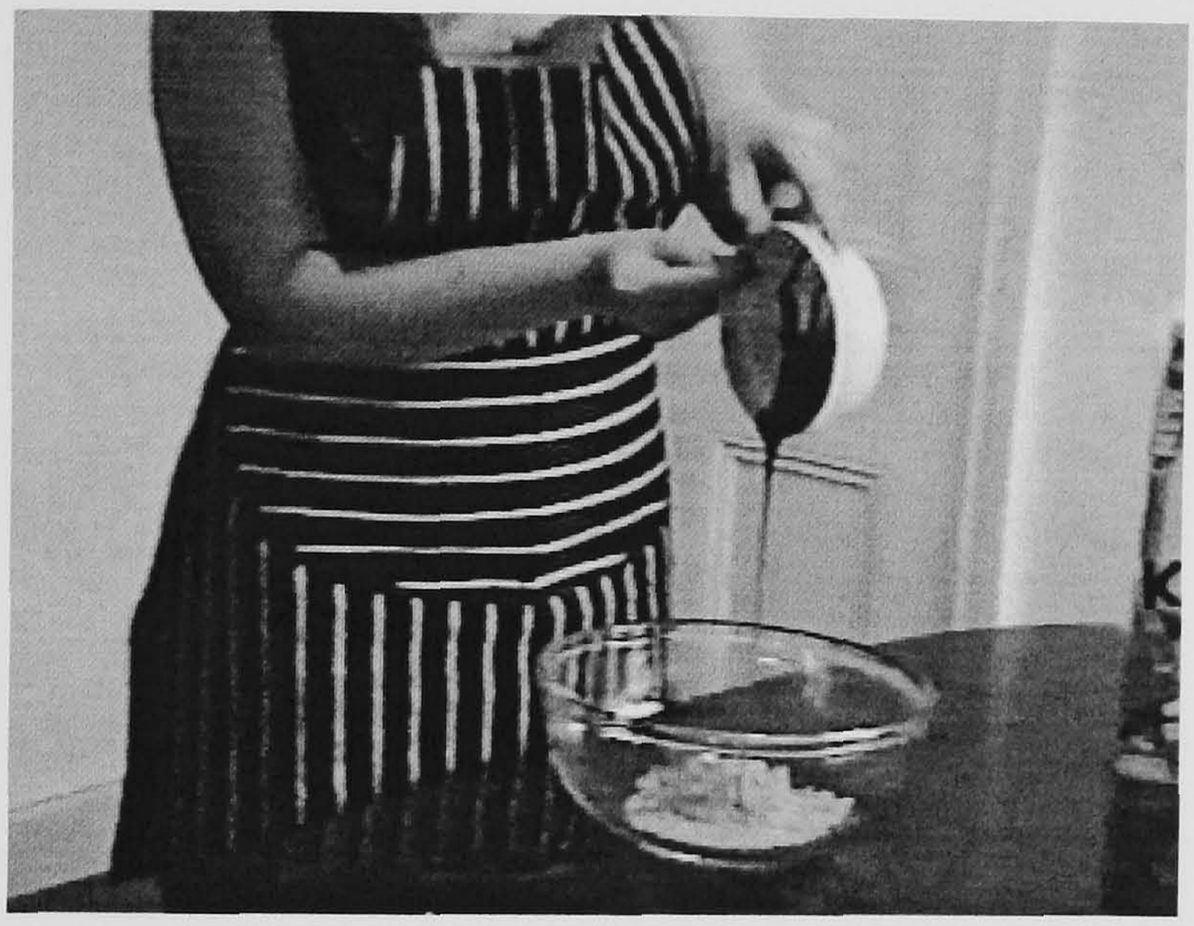
Memon, Holley, Wark, Bull and Kohnken (1996) trained interviewers to use the cognitive interview and children were then questioned about their memory for a video clip that they had seen earlier. The main aim of the study was to assess whether the cognitive interview would increase children's resistance to suggestive interviewing techniques. The cognitive interview resulted in more correct responses. The results revealed that the negative effects on children's responses to misleading questions are greatly reduced when they were asked after a cognitive interview, supporting the inoculation effect of the cognitive interview. The implications of this suggest that if suggestive questioning is required then they may be less damaging when they are asked following a cognitive interview.

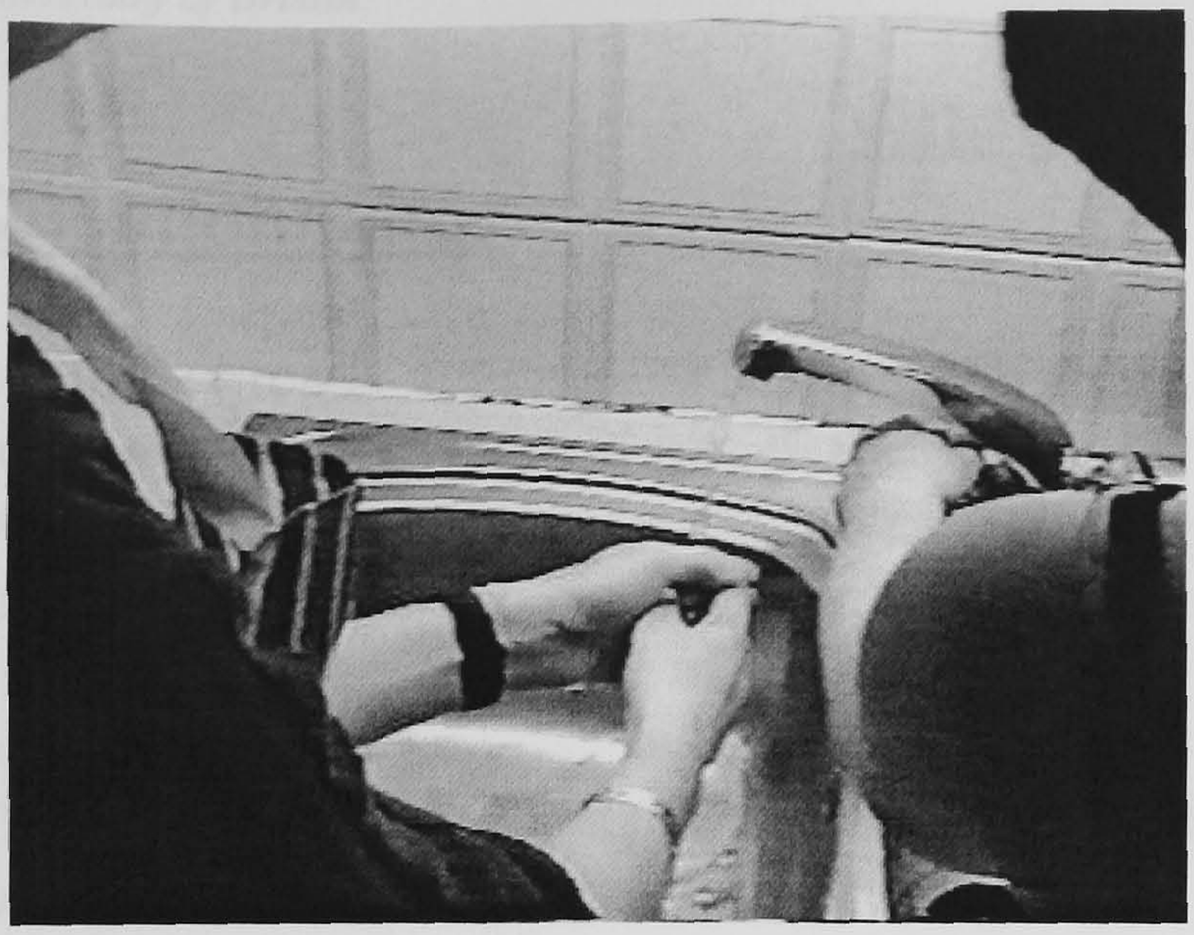
Researchers have broken down the aspects of the cognitive interview and research has been conducted on certain aspects, including the effect of building rapport, and the environmental context of the interview. Goodman and her colleagues (1991) addressed the effect of the interview environment. Children aged 3-5 years and 5-7 years had 3 inoculations and were later questioned in a 'reinforced' environment where they were interviewed by a friendly interviewer and provided with drinks, cakes etc or they were not 'reinforced'. There was a developmental trend in recall, but the main finding was that children interviewed under the 'reinforced' conditions made fewer errors. This led Goodman to conclude that children should always be interviewed in a warm, friendly and

supportive environment so that they feel able to counter the false suggestions of adults. It is important to follow this advice with caution however as providing this type of environment can become a form of biasing and lead to the children providing more inaccurate information in order to please the adult and prolong the praise that they are receiving (Bruck, Ceci & Hembrooke, 1998). It is important to note that this study included many variables such as a comparison of delay, and comparisons of questioning techniques, it is difficult therefore to conclude that the environmental factors are the main reason for the differences found in this study.

Appendix 3

The sequence of pictures shown to children via laptop computer.





Appendix 4

Questionnaire

It will be greatly appreciated if you could answer the following questions in as much detail as possible. I would like to interview your child about their memories of certain events that occurred during their lives and would therefore appreciate details of the location, time of year, circumstances surrounding the event, feelings at the time, etc.

Can you describe 2 events that involved your child and that you believe your child will remember, in as much detail as possible:

that took place in the past 3 months.

that took place in the last year.

Please tick if any of the events below have ever happened to your child.

Getting a new pet dog	☐	Stayed at a friends' house overnight	☐
Had a baby brother/sister	☐	Stayed in hospital for some illness/injury	☐
Travelled on an areoplane	☐	Watched a film at the cinema	☐
Visited London	☐	Been lost in shop or shopping centre	☐

University of Bristol

Appendix 4

Dear Parent

16 February 1999

STUDY OF CHILDREN'S MEMORY

As part of my PhD research, I am conducting an investigation into young children's memory. This research is supervised by Dr DB Wright in the Psychology Department at the University of Bristol.

Christchurch Primary School has kindly agreed to help me with this research, and I would be very grateful if you would consent to your child participating in the study. All testing will be carried out at school, and there will be no disruption to the normal school day. Children will be required to make, (and consume) some chocolate cakes, and be shown a short film, after which they will complete a memory task. The whole procedure will last less than 20 minutes and has been designed to be fun for the children.

All participants will remain anonymous in the final report, and the results of test will be kept strictly confidential.

I would be extremely grateful if you could indicate if you are happy for you child to participate in this study by completing the form attached to this letter. **Please return the consent form to your child's teacher, before 1 March, when testing will commence.**

Your help would be very much appreciated. If you have any queries please do not hesitate to contact me at the above telephone number. Many thanks.

Yours sincerely

Sara-Jayne Williams
Research Postgraduate

Appendix 5

Teddy has a bad day

Scene 1
Theme
In the kitchen the child is playing with teddy on the floor, they are playing with some building blocks. The child is laughing and complaining as they keep falling down. After about 1 minute they decide to play a game together and to have a tea party. The child who is wearing a hat makes sure that she has all of the things that she needs for the party, she runs back and forth to the kitchen bringing in plates, cups and saucers, teapot etc.

Script
Child - Laughs, Teddy stop making the blocks fall down all the time, you're so funny.
Child- Teddy, would you like to play a new game with me. I know why don't we have a tea party? Oh great I'm so glad that you want to do that too teddy, you're the best teddy in the world.
Child - I'm going to make sure that we have everything we need.
Child - I've got the tea pot. Here's the milk. Here are some plates. Here's the cup & saucers.

Scene 2
Theme
Child decides that teddy should sit in the chair so she makes sure he is sitting comfortably, and puts him near the table

Script
Child - I'm so glad we're going to have a tea party teddy, it will be such good fun, but I think that you need to be a little closer to the table so that you can reach.
Child - I'll just put you onto this chair, and you can reach the table, and then we can start to have our party.

Scene 3
Theme
The child and teddy have their tea party together. The child pours teddy some milk as teddy whispers to her that doesn't like tea. They talk about going to the playground when they have finished their tea and the child says that she would like to go on the slide.

Script
Child - Right then teddy I'm going to pour a drink for us, what would you like.
Child - Oh I'm sorry teddy I forgot that you don't like tea, oh course you can have some milk, I'll pour it for you.
Child - I will pour myself some tea from the tea pot.
Child - Now we can have our drinks

Child - Teddy would you like to go to the playground after we've had our party? Oh, I'm so glad that you do want to do that too. I'm really looking forward to going on the slide. It will be such good fun.

Scene 4
Theme
The child goes into the kitchen to fetch some cake. The robber is standing by the door hiding behind a large book. When the child isn't looking he peers from the book, then quickly hides himself again. The child disappears to the kitchen and teddy is left alone.

Script
P1 - Teddy, would you like some cake, I've got a lovely chocolate cake in the kitchen.
P1 - Yes I'd like some chocolate cake too, I'll just go and fetch it.

Scene 5
Theme
The child moves into the kitchen and turns her back. The robber Puts the book down and comes into the room, we can see the colour of his hair (brown), and he quickly steals teddy and takes him away.

Robber - Ha Ha I've got teddy now. At last, he'll be my teddy.

Scene 6
Theme
The child comes back from the kitchen, she is very upset, and suggests that teddy may have been taken into a car. She goes outside to check and sees a policeman standing by the roadside eating a sandwich. She tells the policewoman what has happened and, he tells her to go inside and he will find teddy.

Script
Child - Oh no Teddy has been stolen. Oh what am I going to do, where has teddy gone?
Child - Someone has taken teddy and I think that they've taken him to their car.
Child - Thank goodness you are here
Policewoman - You look so upset what is the matter? Can I help you?
Child - yes I'm very upset, because my teddy has been stolen and I don't know what to do. Will you help me find him?
Policewoman - Don't worry miss, go inside and I will find the man who stole teddy and bring him back to you straight away.

Scene 7
Theme

The Policewoman knocks on the door and the child opens it, teddy has been found. The policewoman tells the child that the robber has been sent to jail and that she doesn't have to worry anymore.

Child - oh thankyou so much policeman you've found teddy.
Policeman - yes I found him for you and you don't have to worry anymore because the robber has been sent to jail and, so you may carry on playing with teddy.
Child - thankyou so much, it's so nice to have teddy back. I love him.

Appendix 6

Questions

Question 1	What was the little girl in the video wearing?	Real
Question 2	What was the Teddy bear wearing?	Irrelevant
Question 3	What did teddy have to drink?	Real
Question 4	What did teddy play on at the park?	Irrelevant
Question 5	What was the robber hiding behind?	Real
Question 6	What colour was the car that Teddy was taken to?	Irrelevant
Question 7	What happened to teddy in the end?	Real
Question 8	What did the policeman have in his sandwich?	Irrelevant